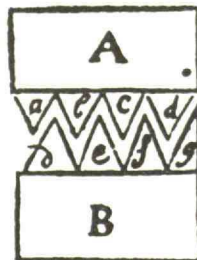
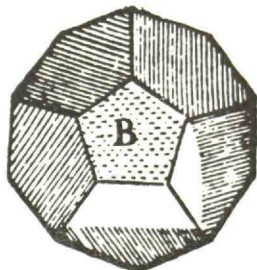
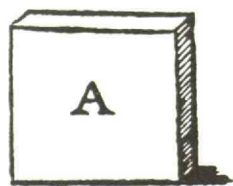
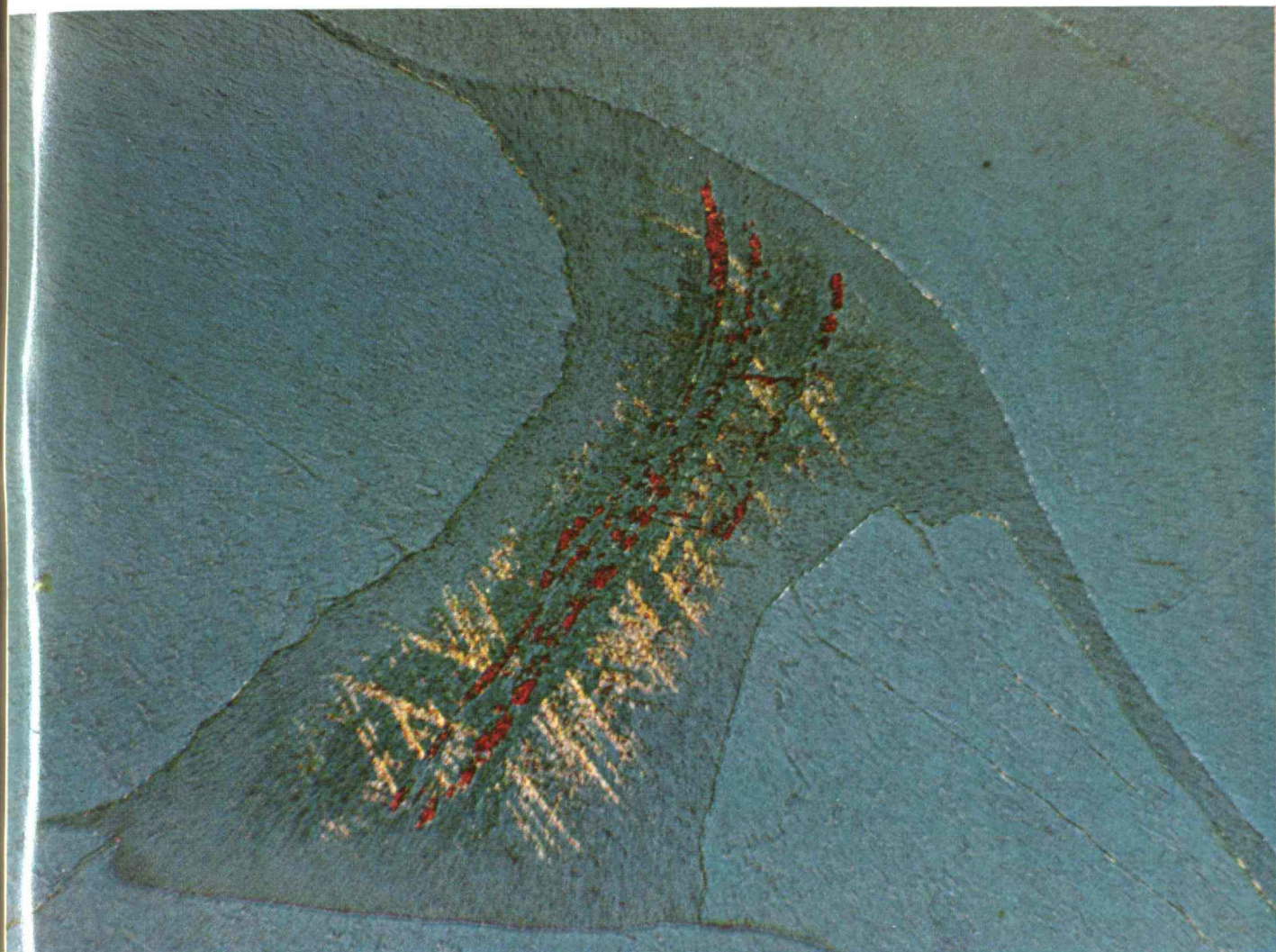


Technology Review

Edited at the Massachusetts Institute of Technology



April 1966

The Prehistory of Solid-State Physics

technology review

Published by MIT

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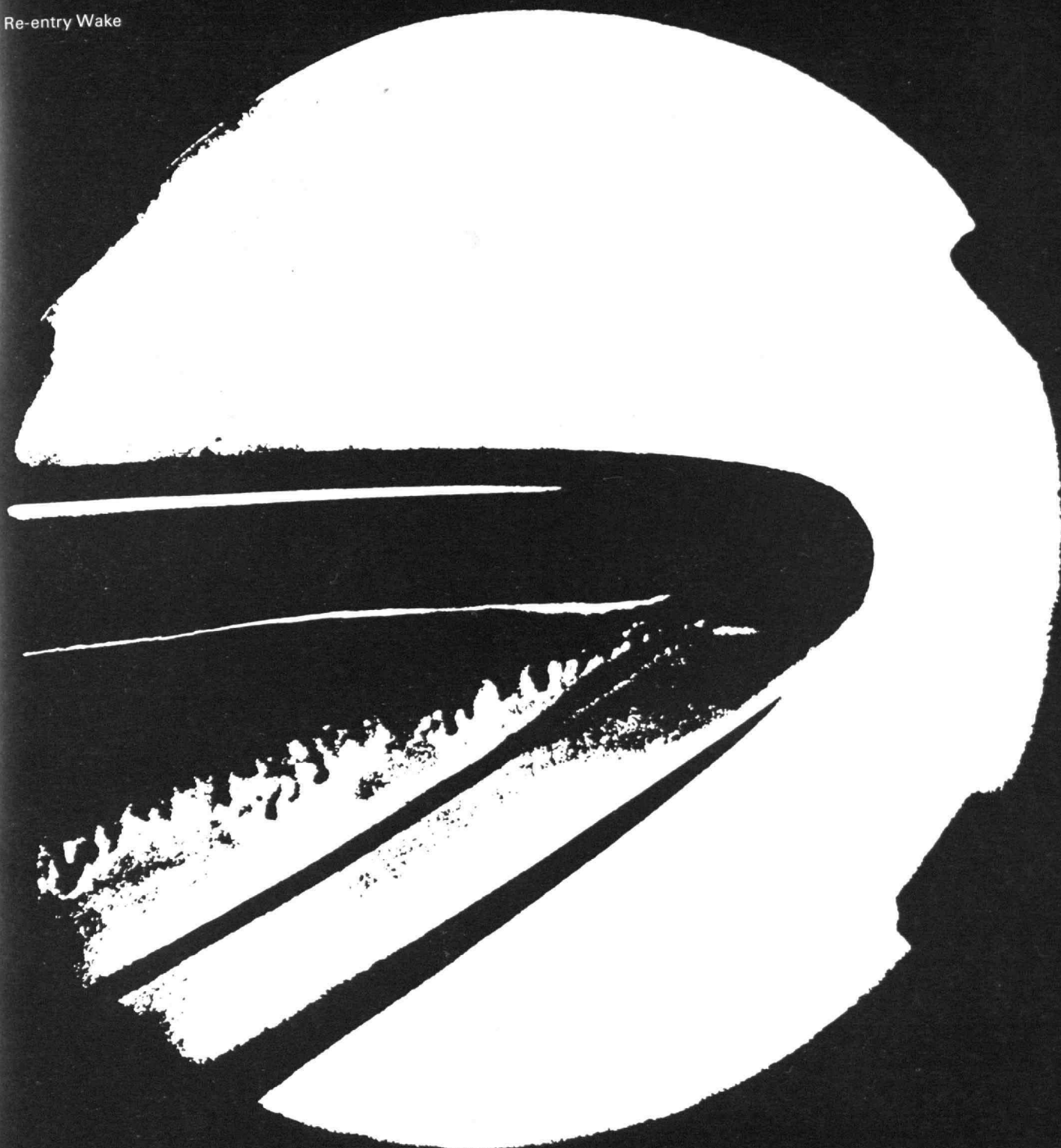
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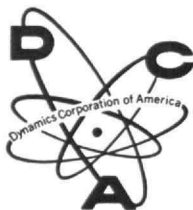
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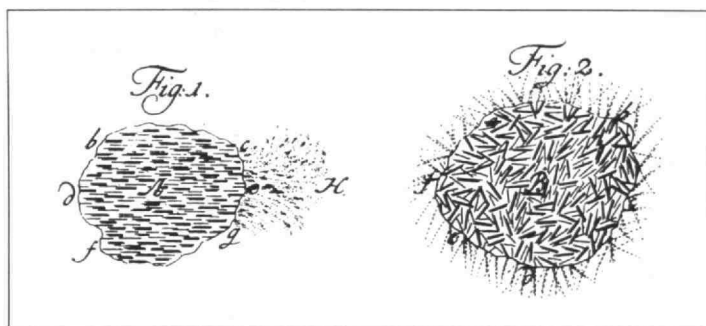
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THE PREHISTORY OF SOLID-STATE PHYSICS

17

Cyril Stanley Smith, '26, reviews the background of a science that marks a change in physicists' attitude toward matter.



Schematic drawings illustrating the arrangement of parts in a ferromagnetic material when magnetized (Fig. 1) and when demagnetized (Fig. 2). (From Emanuel Swedenborg, *Principia Rerum Naturalium*, Dresden and Leipzig, 1734.)

ESCAPE TO THE ENDLESS FRONTIER

26

Don K. Price raises the question whether our democratic system can cope with the growing power of science.

CHANGING ORGANIZATIONS

36

Bureaucracy is dead, but the system that may replace it augurs a life of ambiguity and tension, says Warren G. Bennis, '55.

THE BUSINESS OF PEACE

42

Thomas J. Watson, Jr., urges multinational corporations join to help establish a basis for world peace.

VITA: New Way To a Better World

45

A volunteer organization of scientists and engineers combines idealism with practical works.

Individuals Noteworthy	4
Calder in Review	48
'The Big Sail'	50
The Trend of Affairs	56
Notable New Books	66
Institute Yesteryears	70

COVER: Thermal tinting technique brings out this pattern in a cross section of the 50-kilogram Breece meteorite, found in 1921 in New Mexico. With a microbeam probe, Associate Professor Robert E. Ogilvie, '52, and associates have analyzed the iron-nickel ratio in the outer (kamacite) area, the yellow-orange center (plessite) and its border (taenite). Thereby they estimate that the meteorite took 10^8 years to cool and that its parent body was 200-800 kilometers in diameter. Earlier scientists also explored crystal structure, and the color photo and the Seventeenth Century drawings together illustrate the growth of solid-state physics, as discussed by Professor Cyril S. Smith, '26.



Four Receive Awards

The Institute of Electrical and Electronics Engineers recently gave four of 10 awards to Alumni of M.I.T.

Claude E. Shannon, '40, Donner Professor of Science at M.I.T., received the Medal of Honor, the principal IEEE award given for an exceptional contribution to the fields of science and technology encompassed by the IEEE. Dr. Shannon was recognized "for his development of a mathematical theory of communications which unified and significantly advanced the state of the art."

The Edison Medal, given annually for technical achievements extending over a period of years, was presented to Wilmer L. Barrow, '29, "for a career of meritorious achievement—innovating, teaching and developing means for transmission of electromagnetic energy at microwave frequencies." Dr. Barrow is vice-president—research and development, Sperry Gyroscope Company, Great Neck, N.Y.

The Education Medal for outstanding contributions to engineering education was given to William H. Huggins, '53, Westinghouse Professor of Electrical Engineering at the Johns Hopkins University. Dr. Huggins was cited for "his creative approach to and extraordinary effectiveness in teaching; and for his abiding interest in and rapport with students."

Robert G. Gallager, '57, received the W. R. G. Baker Prize Award presented annually for the best paper originating in any of the IEEE *Transactions*, for his paper "A Simple Derivation of the Coding Theorem and Some Applications." Dr. Gallager is associate professor of electrical engineering, M.I.T. Research Laboratory of Electronics.

Heads ETV Commission

The Carnegie Corporation has appointed James R. Killian, Jr., '26, Chairman of the Corporation, as chairman of a national commission to study educational television.



One of 11 scientists and engineers so honored, Professor Emeritus Warren K. Lewis, '05, received the National Medal of Science from President Johnson on February 10.

On Maritime Board

J. Harvey Evans, M.I.T. Professor of Naval Architecture, has been asked to serve as a member of the Maritime Transportation Research Board. Set up last October by the National Academy of Science's Division of Engineering and Industrial Research, the new Board will serve as a focal point for stimulating, correlating, and advising on research needs of maritime transportation.

Professor Evans was graduated from the University of Liverpool in 1937 and came to M.I.T. 10 years later. He became a professor and executive officer in the Department of Naval Architecture and Marine Engineering in 1961.

Provost Honored

In February, Charles H. Townes, M.I.T. Provost, traveled to Israel on a dual mission—to advise on the scientific program at the Weizmann Institute in Rehovoth and to receive an honorary doctorate from the Hebrew University of Jerusalem.

At the Hebrew University, Dr. Townes was cited for his work in physics and for his "contribution in producing a generation of young scientists in many parts of the world, including Israel, who are carrying out their work . . . according to the standards you have set."

In March, Dr. Townes received an award from Dickinson College.

(Continued on page 6)

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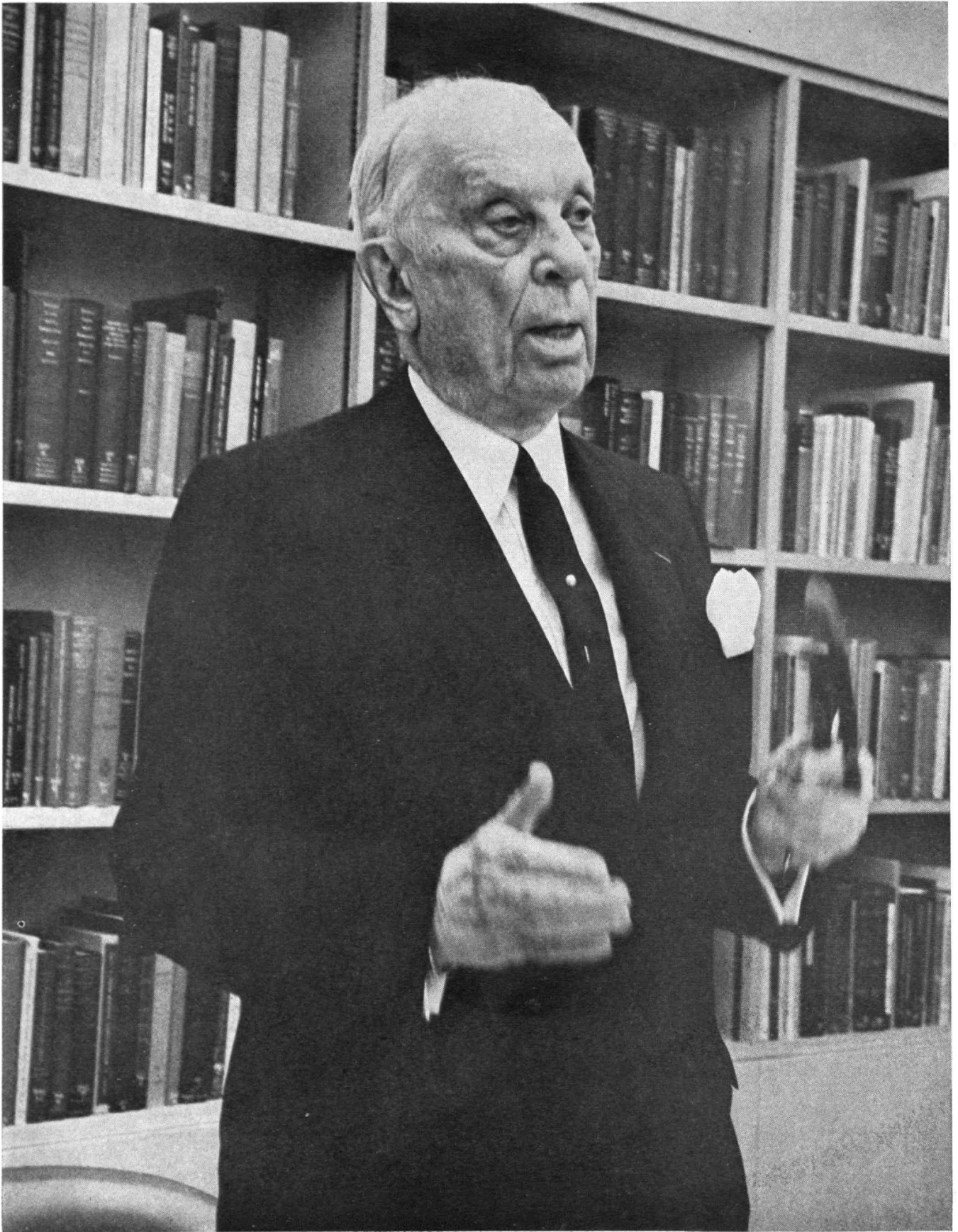
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(Continued from page 4)



ALFRED P. SLOAN, JR., '95

Alfred P. Sloan, Jr., '95, the Institute's most eminent alumnus and its greatest benefactor, died in New York on February 17 in his 91st year.

He had been associated with the General Motors Corporation since 1918, when the Hyatt Roller Bearing Company—with which he had gone following graduation from the Institute—and its associated United Motors Corporation became part of G.M. and Mr. Sloan became a vice-president and director of the parent company. He was G.M. president from 1923 to 1937, chairman of the Board of Directors from 1937 to 1956 (continuing as the chief executive of the Corporation until 1946), and honorary chairman from 1956 until the time of his death. Mr. Sloan's recent autobiography, *My Years with General Motors*, is already a classic in the literature of business management.

"No university could ever hope for a more loyal or more generous alumnus," said Julius A. Stratton, '23, President, in a statement upon Mr. Sloan's death. "In the 70 years that have passed since he was graduated from M.I.T., Mr. Sloan has constantly encouraged us in bold ideas, wise counsel, and unfailing support."

In describing his feelings about M.I.T., Mr. Sloan once wrote, "Every alumnus of the Institute owes the Institute a debt of gratitude and appreciation for conditioning him to better meet the problems of life." He lived up to this belief through long and distinguished service. Mr. Sloan was elected an Alumni Term Member of the Corporation in 1926 and became a Life Member in 1932. He served with enthusiasm and vigor as chairman and member of numerous Standing and Visiting Committees of the Corporation and as honorary chairman of two major capital fund efforts. At the time of his death, Mr. Sloan was a member of the Corporation's Standing Committees on Investment and on Development and was Chairman of the Advisory Council of the Alfred P. Sloan School of Management—the

"As alumnus in the Class of 1895, as a Member of its Corporation for nearly 40 years, and as a deeply loyal friend, Alfred Sloan helped to make M.I.T. a greater institution. He was its greatest benefactor, but he preferred not to have any public recognition made of the munificent total of his gifts. He wished, rather, that his contributions to M.I.T. be expressed in terms of the creative ideas and programs he initiated here.

"He sponsored the M.I.T. Sloan Fellowship Program, pioneer executive development program in the United States. He founded the Alfred P. Sloan School of Management and the Center for Advanced Engineering Study. He initiated and made personal contributions to a \$15 million Fund for Basic Research in the Physical Sciences. Before he died, he had assured M.I.T. of \$5 million for a Faculty Fund, and in his will he provided an additional \$10 million for basic research in the physical sciences. In these and countless other ways, he contributed to the advancement of the Institute in education and research.

"We who have had the privilege of knowing him in his relations with M.I.T. pay tribute to his creative devotion to education, to his great intellectual gifts as a pathbreaker in all the fields that he touched.

"He will be long remembered as an innovator pre-eminent in the field of corporate organization and management, and a philanthropist of exceptional wisdom and magnanimity. In recalling the power of his mind and personality and the generosity of his spirit, we at M.I.T. rejoice in his greatness and feel his loss more deeply."

—J. R. Killian, Jr., '26

school which he founded by generous gifts in 1950.

Mr. Sloan's name is a byword on the M.I.T. campus. It is associated with the 12-month program of studies in Executive Development for promising young management personnel; the Automotive Laboratories completed in 1947; the Metals Processing Laboratory built in 1952; and the School of Management, the building which houses it, the school's principal research fund, a distinguished professorship, and a second professorship established by the Alumni of the Sloan Fellowship Program.

An additional \$10 million was provided for the Institute under a codicil to Mr. Sloan's will; the latter was designated for support of the Alfred P. Sloan Fund for Basic Research in the Physical Sciences, which he established with gifts from himself and the foundation in 1964.

Mr. Sloan once summarized his formula for success this way: "Realize the necessity of doing a better job every day. Keep an open mind and work hard. The last is most important of all. There is no short cut."

Even before he entered M.I.T. from Brooklyn, N. Y. (where his father was a successful coffee and tea importer), Mr. Sloan was following this formula. He expedited his entrance to the Institute with special instruction at the Polytechnic Institute of Brooklyn. At M.I.T. he completed the four-year Course in Electrical Engineering in three years by passing up summer vacations, and was graduated at the age of 20. His undergraduate thesis (performed with the late Benjamin Adams, '95) was on "A Study of the Methods of Testing the Efficiency of Transformers."

Mr. Sloan's first problem, on graduation, was to find a job, and he has said that this period was the most discouraging of his life. The mechanical age, as he described it, had not yet come into its own, opportunities were limited, and he found jobs few and far between. Finally he located a position as drafts-

(Continued on page 8)

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INDIVIDUALS NOTEWORTHY (Continued from page 7)

man with the Hyatt Roller Bearing Company, a pioneer producer for whose product there was no tangible market. Indeed, the prospects were so dim that the enterprise appeared about to be liquidated until a group of investors, including Mr. Sloan's father, made one last effort to see what could be done; in 1899 they asked young Alfred Sloan to take over as general manager, a title more of form than of substance.

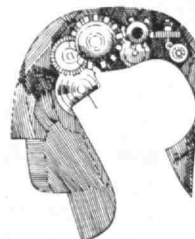
It was Mr. Sloan who saw, during this period, the potential for the automotive business and for Hyatt as a supplier of essential parts. In the six months' trial period given him by the investors Mr. Sloan managed to make a profit, and his career was on its way.

Sixty-four years later Mr. Sloan summarized his business philosophy in *My Years with General Motors*: "The causes of success or failure are deep and complex, and chance plays a part. Experience has convinced me, however, that for those who are responsible for a business, two important factors are motivation and opportunity. . . . Good management rests on a reconciliation of centralization and decentralization, or 'decentralization with coordinated control.' From decentralization we get initiative, responsibility, development of personality, decisions close to the facts, flexibility—in short, all the qualities necessary for an organization to adapt to new conditions. From coordination we get efficiency and economies.

"I believe in competition as an article of faith, a means of progress, and a way of life . . . Growth and progress are related, for there is no resting place for an enterprise in a competitive economy . . . Success may bring self-satisfaction. In that event, the urge for competitive survival, the strongest of all economic incentives, is dulled. The spirit of venture is lost in the inertia of the mind against change . . . This is the greatest challenge to be met by the leader of an industry."

As to his support of science, Mr. Sloan once said: "I am convinced . . . there is no problem beyond the reach of aggressive scientific attack."

(Continued on page 9)



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Scientist Promoted

Karl Pfister, 3d, '40, has been elected vice-president for developmental research at Merck Sharp & Dohme Research Laboratories, where he will act as liaison between Merck's Laboratories and their International Division in the development of human and animal health products.

Dr. Pfister, whose inventions 'Aldomet' and 'Inversine' are widely used for the treatment of hypertension, has been with Merck and Company since 1942, when he received his Ph.D. in organic chemistry from M.I.T. In 1964, the Merck Board of Directors honored his work on 'Aldomet' with their Scientific Award, giving a \$25,000 grant to M.I.T. to establish the Karl Pfister Visiting Professorship in Chemistry.

Nominated for Board

The Standard Oil Company of New Jersey recently announced the nomination of Julius A. Stratton, '23, as a director, and the retirement of Marion W. Boyer, '25, as Executive Vice-president and director of Jersey Standard.

Dr. Stratton will retire as President of M.I.T. in June, when he will become chairman of the Ford Foundation Board of Trustees. He is also a director of Westinghouse Electric Corporation.

Mr. Boyer, who has been with Standard Oil since 1927, is chairman of the Board of Trustees of the Sloan Kettering Institute for Cancer Research and a trustee of the Alfred P. Sloan Foundation.

Laboratory Dedication

A multimillion-dollar Bausch & Lomb grating and scale laboratory in Rochester, N.Y., was dedicated in February in honor of David Richardson, '37, in recognition of his contributions to the science and technology of diffraction gratings.

Mr. Richardson, a recognized authority on diffraction gratings for spectroscopic analysis, has been with Bausch & Lomb since 1947. He was graduated from the University of Cincinnati and received his master's degree in applied physics at M.I.T. in 1937.

(Continued on page 10)

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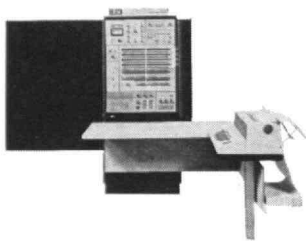
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INDIVIDUALS NOTEWORTHY

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New Posts

Named in the news of promotions elections, and appointments recently were:

Oscar P. Young, '20, as President and Director, Lytron, Inc. . . . *Hunter Rouse*, '29, as Dean, College of Engineering, State University of Iowa . . . *Ralph E. Scott*, '30, as President, Osborn Engineering Company;

Francis R. O'Leary, '31, as European Vice-president, International Group, Koehring Company . . . *Sidney Sussman*, '37, and *Howard T. DuBois*, '46, respectively, as Vice-president and as Secretary, Water Service Laboratories, Inc. . . . *Charles F. DeMaily*, '40, as Executive Vice-president, Emhart Corporation;

Herbert G. Weiss, '40, and *Herbert H. Woodson*, '51, as nominees, Executive Committee; *Robert A. Manning*, '52, as nominee for Vice-chairman, Boston Section, Institute of Electrical and Electronics Engineers . . . *John H. Cantlin*, '42, as Executive Vice-president, Smithcraft, Corporation;

Robert K. Dix, '43, as President, Enjay Chemical Company . . .

Robert E. Benedict, '44, as Executive Vice-president, Phelps Dodge International Company . . . *Mrs. Philip F. (Mary F. Penney) Wagley*, '47, as Headmistress, St. Paul's School for Girls;

Chester R. Gates, '48, as Vice-president—International, Northrop Corporation . . . *John A. Wolfe*, '48, as Divisional Vice-president—Government Systems, Itek Corporation . . . *Charles W. Pike*, '49, as Administrative Vice-president, Merck Sharp & Dohme Research Laboratories;

Alexander Vanderburgh, Jr., '49, *Frank E. Heart*, '51, and *Hawley K. Rising*, '52, respectively, as Secretary Chairman, as Special Adviser, and as Vice-chairman, Spring Joint Computer Conference, American Federation of Information Processing Societies;

Walter S. Attridge, '50, and *Philip R. Vance*, '50, respectively, as Acting Head, Command Systems Department, and as Special Assistant, Systems Engineering Division, The Mitre Corporation . . . *Frederick J. Bumpus*, '51, as Vice-president—Underwriting, and as Secretary, Boston Manufacturers Mutual Insurance Company and the Mutual Boiler and Machinery Insurance Company . . . *Ernest F. Jensen*, '51, as Treasurer, Tridair Industries.

(Concluded on page 14)



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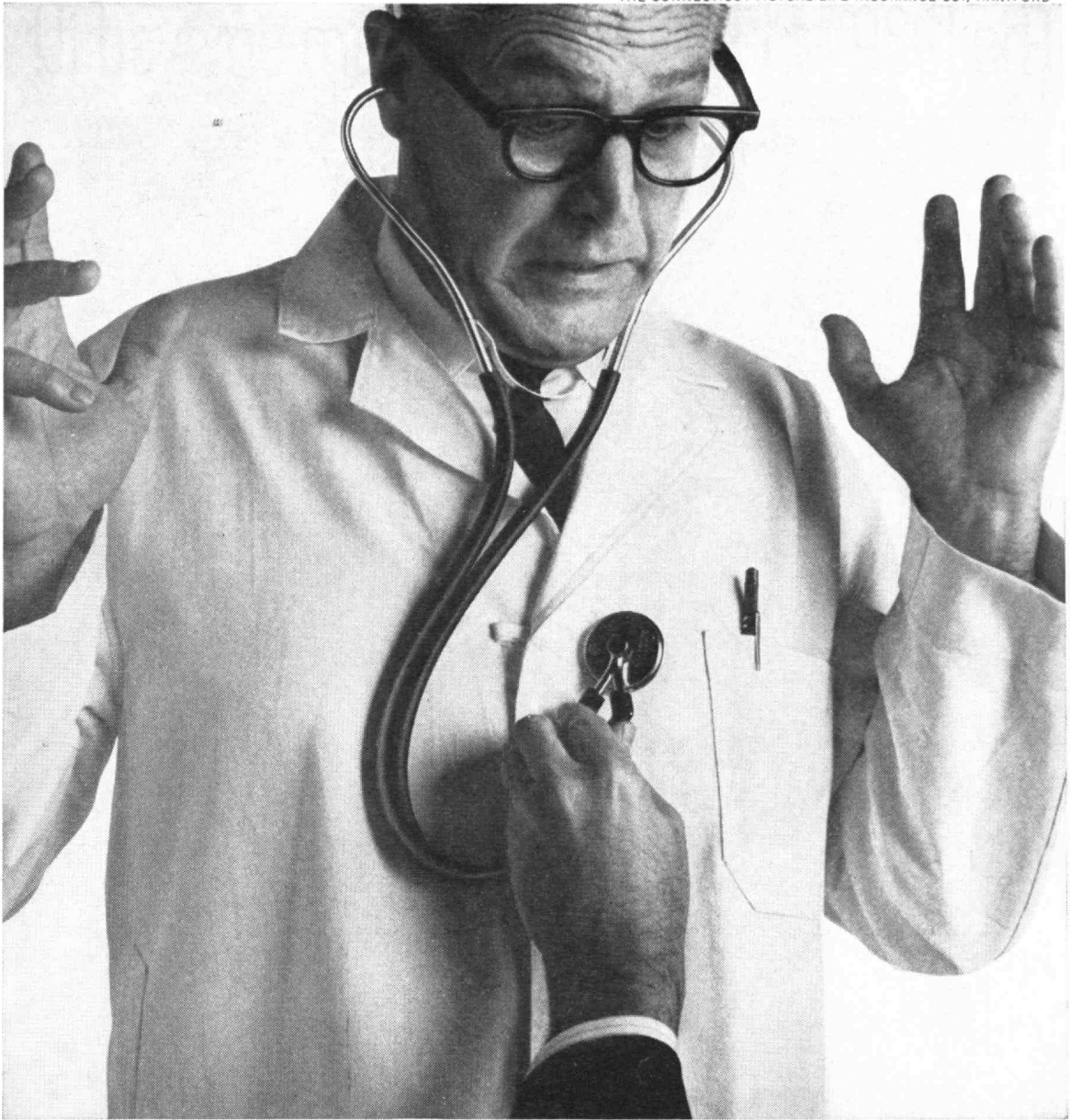
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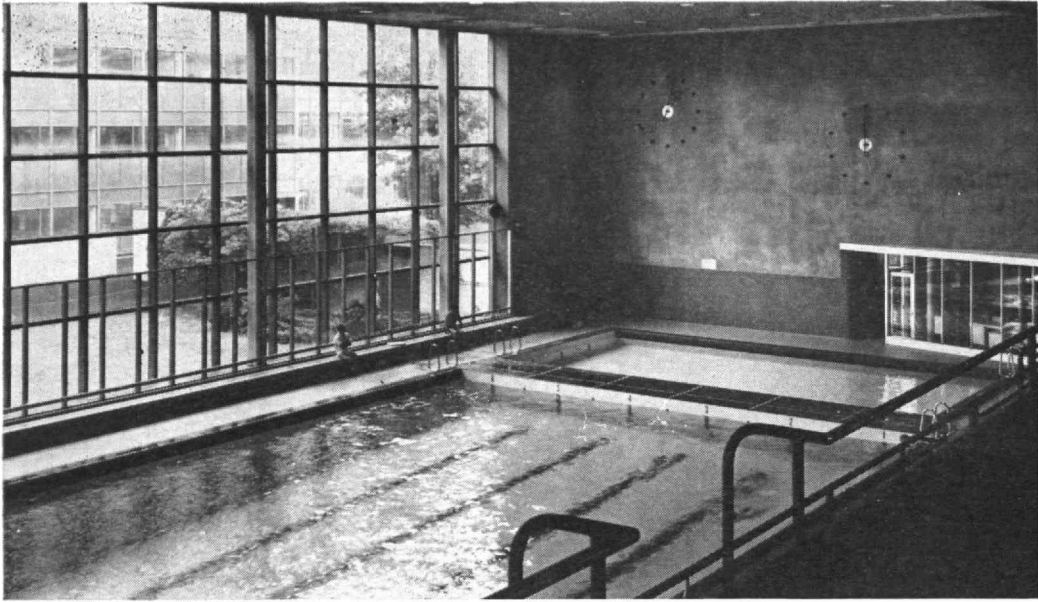
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INDIVIDUALS NOTEWORTHY

(Concluded from page 10)

Photogrammetry Award

The U.S. Department of Commerce recently awarded its highest honor, a gold medal, to G. Carper Tewinkel, '60, for "rare and outstanding contributions" to the department and to the nation.

Mr. Tewinkel is a photogrammetrist in the Commerce Department's Environmental Science Services Administration (ESSA) and has made technical contributions to the science of photogrammetry that have resulted in improvements in ESSA's surveying and charting programs.

Mr. Tewinkel, who did graduate work at M.I.T. in 1959-1960, is editor of the *Photogrammetric Engineering Magazine* published by the American Society of Photogrammetry.

Honors to Alumni

Recipients of recent awards and similar distinctions have included:

Harold F. Dodge, '16, as an Honorary Member, American Society for Quality Control . . . Robert C. Sprague, '23, the "New England Man of the Year" Award by the New England Council . . . C. Wesley Meytrott, '27, the Medal for Cooperation by the James H. McGraw Award for Electrical Men;

Sidney L. Kaye, '30, as a Fellow, the Royal Society of Health, London . . . Sutton Monro, '42, a Science Faculty Fellowship by the National Science Foundation . . . Bernard D. Steinberg, '49, as a Fellow, the Institute of Electrical and Electronics Engineers . . . Richard W. Tsien, '65, a Rhodes Scholarship for 1966.

Advanced Concepts Post

Milton B. Trageser, '51, has been appointed Director for Advanced Concepts at M.I.T.'s Instrumentation Laboratory.

David G. Hoag, '46, will assume Mr. Trageser's former duties as Director of Project Apollo, and Ralph R. Ragan, '52, will administer the NASA programs as Deputy Director of the Instrumentation Laboratory.



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TIZARD

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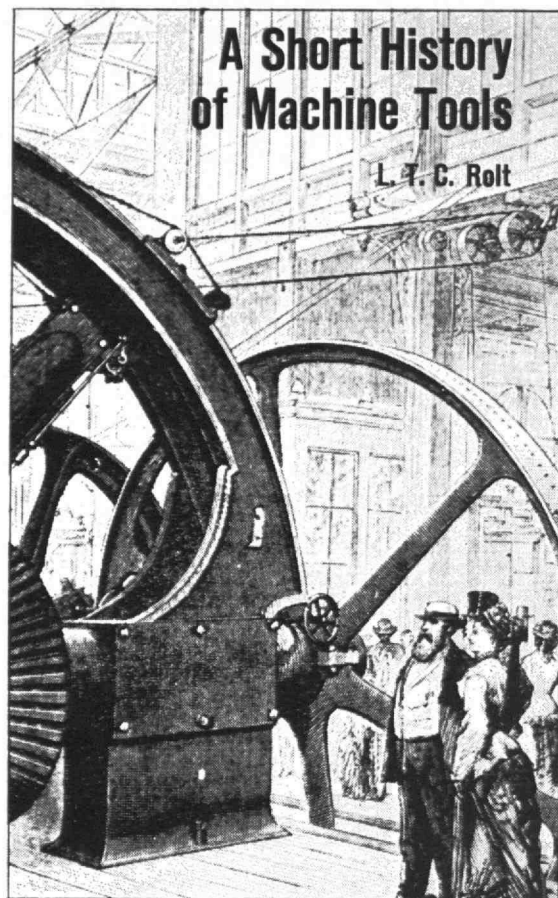
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L. T. C. Rolt

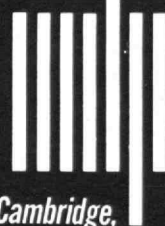


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THE PREHISTORY OF SOLID-STATE PHYSICS

By Cyril Stanley Smith, '26 | Institute Professor

Prehistory implies the selection of a date when history begins. In solid-state physics this is very recent, dating, perhaps, from Debye's specific-heat theory of 1913, but most of all from the famous diffraction experiment of Friedrich, Knipping, and Von Laue in March, 1912. It was this tool of perfection which laid the ground for imperfection to become of interest to physicists. The growth of solid-state physics marks, I think, a basic change in the attitude of physicists toward matter. Virtually all the development of mechanics, marvelous though it was, was based on a treatment of matter that was essentially structureless and whose measured elastic constants and densities gave the constants to put into equations that became ever more elaborate. When physicists at last paid attention to the structure of real crystals, they soon became aware of imperfections, both theoretically and experimentally, and the great flourishing of solid-state physics in the last three decades has been mostly based on the elucidation of the role of mechanical, ionic, and electrical imperfections in a crystal, accompanied, of course, by a continued development of understanding of bonding and dynamics of the ideal lattice.

There would be no physics at all if it were not possible to find models ideal enough to compute and sufficiently close to reality to be meaningful: this has meant selecting areas of study one after another in which this approach would be most fruitful at a given time and ignoring others. It is nevertheless interesting to read Nineteenth-Century treatises on physics, whether research papers or textbooks, and to note the avoidance of the real structure of matter. Despite the development of good crystallography early in the Nineteenth Century and despite the development of an essentially valid ball-stacking model of ionic crystals as early as 1812, virtually all



This article is based on a lecture that Professor Smith gave last year before the American Physical Society. It is reprinted from Physics Today, Vol. 18, No. 12, December, 1965, with the permission of the journal and the author. The illustrations are from C. S. Smith, A History of Metallography, University of Chicago Press, 1960.

Nineteenth-Century physics, when it dealt with any structural concepts at all, was based on the molecule.

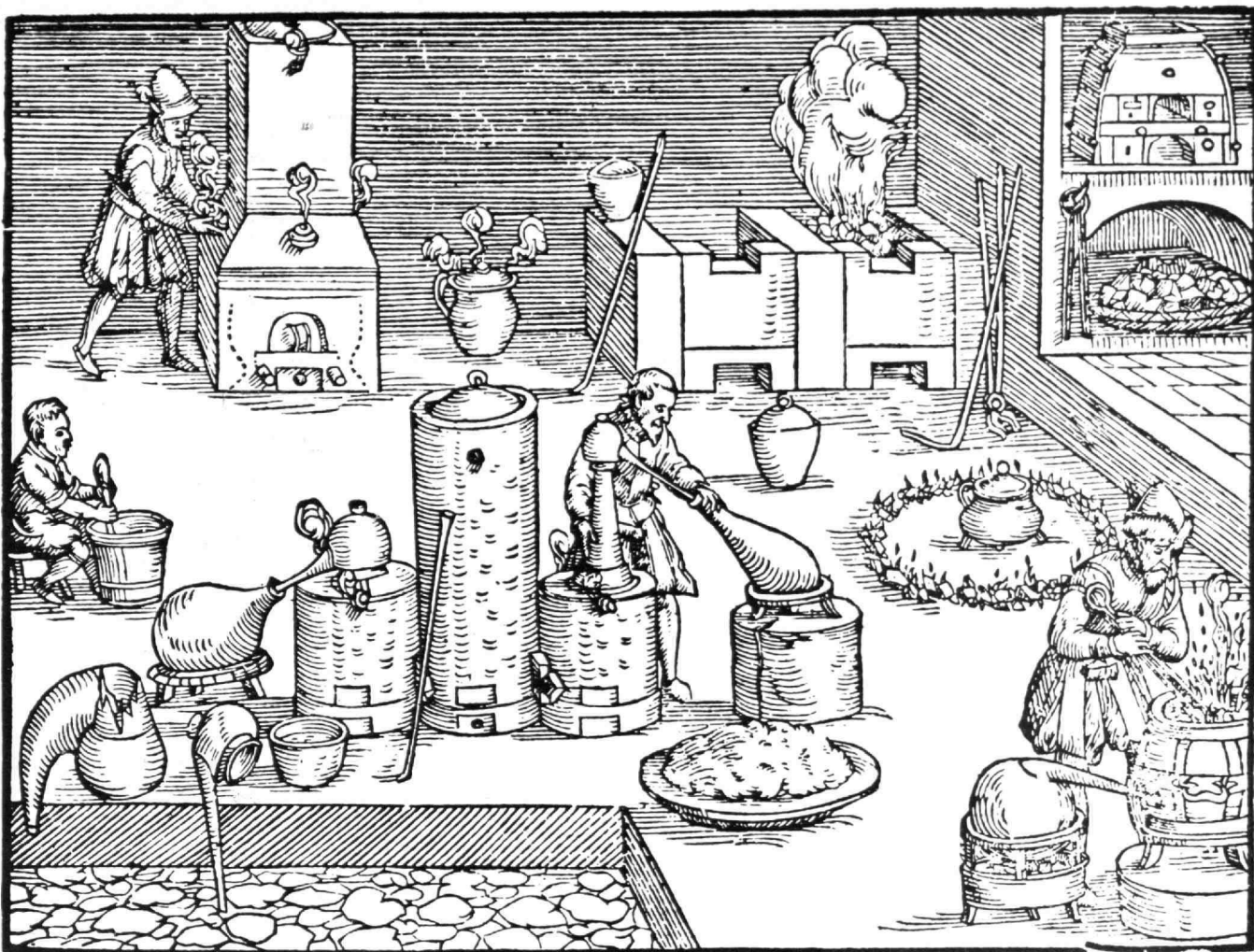
This is not, perhaps, surprising, since the molecule had such a magnificent quantitative success in the kinetic theory of gases and in explaining the composition of chemical compounds. (It is notable, however, that chemists studied only those compounds that fitted the theory, and Bertholet and others who insisted that analyses frequently did not agree with the law of simple multiple proportions were ignored.) Then Cauchy's model of crystal elasticity based on a simple lattice failed to agree with measurement, and all crystalline properties were referred to the anisotropy of the molecule as a unit, not to the arrangement of the units. Von Laue remarks in his *History of Physics* that "no physical phenomenon [of the Nineteenth Century] required the acceptance of the space lattice hypothesis." I think he should rather have said that physicists refused to accept the concept, for the phenomena themselves certainly depended on lattices, while physicists overexploited the adjustable flexibility of the molecule to explain all anisotropic behavior, whether optical, thermal, elastic, or electrical. Perhaps the most revealing index of this blindness is that the great Von Laue himself, a month before he had the epoch-making idea of the diffraction of x-rays from the three-dimensional crystal grating, had to be told by a graduate student that some people supposed that atoms might be arranged in a regular array in a crystal. It was a measure of his greatness how quickly he saw the significance of the relationship to his theory of crossed optical gratings; and it is a measure of greatness again, and of the times, that the graduate student, Paul Ewald, went on to write the first text intended for physicists in which the properties of matter are realistically discussed on the basis of their real structural and mechanical behavior. This was his section in the 11th edition of Müller and Pouillet's *Lehrbuch der Physik*, written in 1927-1928. Ewald drew heavily upon the experimental work of Mark, Polanyi, and Schmid, on the metallurgist's study of grain growth and the properties of single crystals. It was symptomatic that this was an edited book with chapters by different specialists.

There is something about the very nature of physics itself that has produced this late development: one cannot simultaneously have two views of the world, a broad and a narrow one. Perhaps, indeed, physics could turn to real solids only after some centuries of concern with simple mechanics, and perhaps solid-state physics could only result from a fusion of two streams of knowledge which had to have time for development in isolation before they impinged on each other with exciting results. In the Seventeenth Century, when qualitative speculation was still permitted, a natural philosopher could enjoy the diversity of properties of solids, which were explained in terms of the interaction of imaginary corpuscles or parts; rigorous physics following Newton quite rightly discouraged such speculation, but unfortunately the discouragement served also to exclude any interest in the phenomena.*

However, concern with the real behavior of matter, if not a physicist's characteristic, is certainly a human one. The evolutionary advantage that accompanied the ability to exploit the cracking of stone gave rise to man himself. Studies, or perhaps I should say enjoyment, of the plasticity, crystallization, and vitrification of silicates and the selective absorption of certain wavelengths of light by metallic ions in an appropriate environment gave rise to the magnificent art of ceramics. The making of jewelry, tools, and weapons involved knowledge, if not atomistic understanding, of virtually every property now being studied by physicists except electrical conductivity and the effects of irradiation. There is something about man's relationship to matter through his senses that inspired him to experiment empirically with the effect of heat on natural substances, singly and in mixture, at the same time that he was experimenting with social organization and long before he began to develop the more intellectual mechanical arts. Virtually not until the Twentieth Century did the engineer outstrip the materials that had been discovered 4000 years earlier; and progress in metallurgy had been mostly that of making more of the old metals and alloys more cheaply. Thanks largely to recent discoveries of physics—at first electricity and lately nuclear fission—the metallurgist is now forced to be more qualitatively creative than he has been for many centuries. I use the word "quality" intentionally, for I believe that quality (in both of its meanings) has inspired human advance far more than has numerical quantity.

Greek philosophy was much concerned with qualities, culminating in Aristotle's theories of matter, in which the four elements carried the elemental qualities—hot, cold, dry, and moist—in various combinations in a body to give rise to all of the properties that were perceptible to the senses. These ideas dominated most thinking until the Seventeenth Century, and most explanations of the nature of bodies lay in purely *ad hoc* suggestions as to the relative amounts of the qualities, with an ingeniousness but disregard for verifiability that we find shocking today. Nevertheless, it should be noticed that it is precisely the qualities that concern the solid-state physicists that were then regarded as central to understanding of matter—conductivity, plasticity, fusibility, color, texture, and hardness. The Seventeenth Century saw the end of this. Physics—mathematical physics in the pattern that was nucleated in the Middle Ages, began to crystallize around Galileo, and reached marvelous

*I don't wish to accuse physicists of being particularly perverse in refusing to look at crystals. The most recently published history of the constitution of matter bears the promising title, *The Architecture of Matter*, but it is concerned almost entirely with atomic and subatomic concepts. Even historians seem to be unable to see beyond atomic or molecular bricks to the magnificently diverse structures that are composed of them, unless they go the whole hog and study cosmology at the other end of the scale, equally intangible and so equally capable of being oversimplified for the purpose of thought.



Laboratory for assaying metals. Lazarus Ercker, 1574.

maturity with Newton—changed all this, for qualities could not be calculated, and even when it became possible to measure “properties” something had to be left out, everything dependent on the interaction of many parts. Mechanics and optics alone proved amenable to mathematical treatment.

Virtually every advance since the Seventeenth Century has stemmed from the unwillingness of the physicist to talk vaguely about things that cannot be reduced to computable models whose inaccuracies can be exposed and removed by continual interaction with experiment. Science is in very essence both mathematical and experimental, but at times one or the other viewpoint has grown beyond balance. That most marvelous of physicists, Robert Hooke, wrote in 1665: “. . . and here the difficulty is . . . least by seeking to enlarge our Knowledge, we should render it weak and uncertain; and least by being too scrupulous and exact about every Circumstance of it, we should confine and streighten it too much.”

The idea that many properties were somehow related to the interaction of smaller units of structure was developed by Democritus and other early Greek thinkers

and might have reached fruition by interaction with the Pythagorean emphasis upon form had they not been rejected by the most authoritative Greek philosopher, Aristotle. How different the history of science might have been had he been an atomist, or had his work called forth constructive criticism instead of adulation! Really creative thinking occurred again only in late medieval times after the revival of the forgotten atomism. Marshall Clagett at the recent Montreal meeting of the History of Science Society discussed Nicholas Oresme’s remarkable Fourteenth-Century ideas in which he makes the qualities themselves depend on form. He says:

“The ratio of intensities is not so properly or so easily attainable by the senses as is the ratio of extensions,” and then describes how to plot the intensity of a quality normal to the extension of the substance, and discusses a kind of resonance between adjacent bodies depending upon the conformity and diffornity of the arrangements of their representations in quality space. Remarking that experience and philosophy alike show that all natural bodies determine their shapes in themselves, he says they also determine in themselves the qualities that are natural to them, and that, “In addition to the shape that these qualities possess in their subject, it is necessary that they be figured with a figuration that they possess from their intensity,” and, “It is necessary that qualities of

this sort have diverse powers and action depending on the difference in figurations previously described." He does not quite go on to describe a Brillouin-zone polyhedron, but his remarks on the mutually conformable configuration of qualities in seeds would not startle a modern biologist.

Oresme's ideas were based on an intuitive feeling for form. His realization that the intensity of a quality could be plotted so as to make it appreciable to the senses was a great inspiration, but it led to no immediate development. Everyone knows of the great developments of astronomy that occurred in the Sixteenth and Seventeenth Centuries; few people have studied the equally interesting but less fruitful studies on the properties of matter that occurred at the same time, for the practical consolidation of knowledge in this area was not accompanied by a theory of the kind that could become part of the mathematical mainstream of science.

In the Seventeenth Century, natural philosophy reached its prescientific height and this was the last time for three centuries that respectable thinkers concerned themselves with the properties of real solids. Atomism, or at least corpuscular philosophy, was invoked to explain everything; but the shape of the parts, like the proportions of the preceding Aristotelian qualities, were adjustable ad lib, and could not be expressed in the soon-to-be-mandatory mathematical form or related to experiment. Nevertheless, there are some Seventeenth-Century writings that are entrancing for a Twentieth-Century solid-state physicist to read. In a purely qualitative way, physicists and philosophers deduced models of behavior based upon shape, size, and interaction of parts which (if we properly select for each occasion the appropriate unit as an atom, molecule, subgrain, microcrystal, or crystal) are qualitatively as we would have them today. Molecules are formed by parts of different shapes sticking together, and metals are plastic because the parts can slide over each other and change neighbors without losing coherence.

Descartes, who had watched wrought iron coming to nature in the molten bath of a fiery hearth, saw that there was something about particles on one scale which enabled them to be joined into grains within which cohesion was greater than with other grains, though oddly he failed to see that the grains were crystalline. The most popular Cartesian physicist, Rohault, in his *Traité de Physique* (1671), supposes that plastic materials are made of parts with complicated textures intermixed with each other, hooked together like the rings of a chain or entwined like the threads of a cord, while brittle bodies are of simple texture with particles touching one another at only a few places. He talks about the preferred orientation of particles after hammering or drawing, and the preferential clumping of particles into grosser particles under the influence of heat, structures which in steel can be preserved by

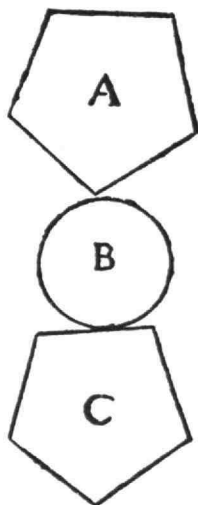
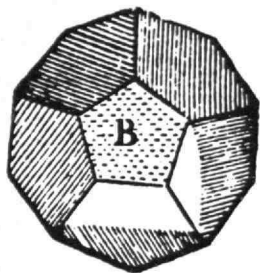
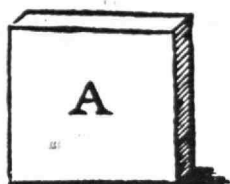
quenching and are responsible for its hardness. Somewhat later (1722), these ideas in the mind of the great Réaumur led to the inversion of the ancient belief that steel was a purified iron (logical enough, since steel resulted from prolonged treatment in fire, which does usually purify) and he suggested that it arose from the addition of some particulate matter ("sulfurs and salts") which could be distributed or segregated by heat treatment within a hierarchy of structures of iron particles with accompanying hardening or softening.

Another Cartesian physicist, Hartsoecker (1696), let his imagination run wild. He cooked up all kinds of amazing contraptions to explain the properties of matter. Corrosive sublimate becomes a ball of mercury with, stuck all over it, particles of salt and vitriol shaped like needles and cutting blades; air is a hollow ball built of wirelike rings to give it the necessary elasticity. He conjectured that the particles of a substance like iron, which is hard when cold but malleable when hot, must have teeth which slide over each other when the particles of heat have sufficiently separated them; the parts of mercury, being spherical, can slide easily between polyhedral particles of gold (is not this indeed the basis of liquid-metal embrittlement?) and so on. After numerous specific examples, he ends, "But I do not wish to deprive the reader of the pleasure of himself making the search following the principles that have been established above." It is precisely this element of uncontrolled imagination in the speculation that made respectable physicists turn their back on this kind of thinking. Yet the particle, of course, usually without any such specific remarks as to its shape and packing, was accepted by virtually everyone after the middle of the Seventeenth Century. As in so many things, Newton provided (in the notes to the second edition of his *Opticks* [London: 1718]) a summary of a viewpoint beyond which it was unwise to go:

There are therefore Agents in Nature able to make the Particles of Bodies stick together by very strong Attractions. And it is the Business of experimental Philosophy to find them out.

Now the smallest Particles of Matter may cohere by the strongest Attractions, and compose bigger Particles of weaker Virtue and many of these may cohere and compose bigger Particles whose Virtue is still weaker, and so on for divers Successions, until the Progression end in the biggest Particles on which the Operations in Chymistry, and the Colours of natural Bodies depend, which by cohering compose Bodies of a sensible Magnitude. If the Body is compact, and bends or yields inward to Pression without any sliding of its Parts, it is hard and elastick, returning to its Figure with a Force arising from the mutual Attraction of its Parts. If the Parts slide upon one another, the Body is malleable or soft. If they slip easily, and are of a fit Size to be agitated by Heat, and the Heat is big enough to keep them in Agitation, the Body is fluid. . . .

This is not the Newton of the *Principia* speaking, but it was the *Principia* that set the tone for physics. Vir-

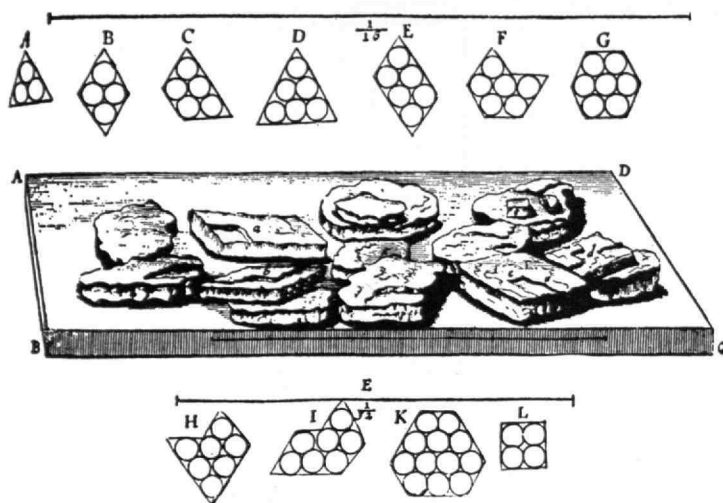


Conjectural shapes of matter according to the corpuscular physicist, Nicholas Hartsoeker (1696). In top figures, A is a refractory and B a fusible material. In middle, the toothed pieces are iron, which is hard when cold because the pieces interlock but malleable when heat separates the parts. The ball with spikes represents mercuric chloride. Bottom three figures are particles of mercury penetrating between polyhedral particles of gold.

tually all speculation on the nature of solids disappears thereafter from the writings of good physicists for two centuries. The physics of solids was limited almost exclusively to idealized elasticity, a favorite subject with mathematicians as well as physicists, but one which, except for the mathematical atomism of Boscovich, was divorced from any concepts as to ultimate structure. This is not to say that there were not speculations on the nature of crystals and even some marvelous mathematics of crystallography to which I will return later, but both of these were outside the mainstream of physics. But I wish to return to the theme of qualities and take up another thread.

The nuclear physicist can laugh at the alchemist's misguided attempt at transmutation, but the solid-state physicist shouldn't. Transmutation has not always had today's connotation of a change in the nucleus of an atom. Looked at qualitatively, the change from a mixture of sand and ashes into glass, from a mixture of malachite, calamine, and charcoal into gleaming brass, or from a white fabric into an Emperor's purple robe is a most spectacular and fundamental change. To Aristotelians, the whole difference between substances lies in their particular combination of qualities, and since it is clearly possible to produce some of these at will, why not others? The modern materials engineer is producing new qualities all the time, but he does not call it transmutation.

As has been argued especially well by Hopkins in his *Alchemy, Child of Greek Philosophy* (1934), alchemy began reasonably enough on the basis of the well-known changes in color and nature which had long been exploited by artisans for decorative purposes in goldwork, in enamels and in dyeing. It was supported by the belief that somehow behind these changes there lay a key to the relationships and transformations in the larger world (a view that anyone with a spark of the artist in him must admire) but it failed eventually simply because the adepts came to have too great a belief in the premature theory, and they became too preoccupied in the observable qualities rather than their compositional causes, and so were unable to benefit from the innumerable experiments that were done. If the yellow matter that came from heating copper with certain substances was regarded as only an inferior gold, the experiment was a failure: it could have been regarded as a more castable, harder, and resplendent form of useful copper. Yet what wonderful physical changes the alchemists produced, and how fervently and how rightly they believed in the significance of the difference between the qualities of a shiny ductile metal; a black, brittle sulfide; a crumbly crystalline salt; gleaming, hard diamond; infusible earths; and the vapors, phlegms, and tars that came from distilling animal and vegetable matter. These properties are the subject of solid-state physics, but there were no solid-state physicists in those days.



A drawing by Robert Hooke showing packing of spheres to match polyhedral shapes in alum and salt crystals. (*Micrographia*, London, 1665.)

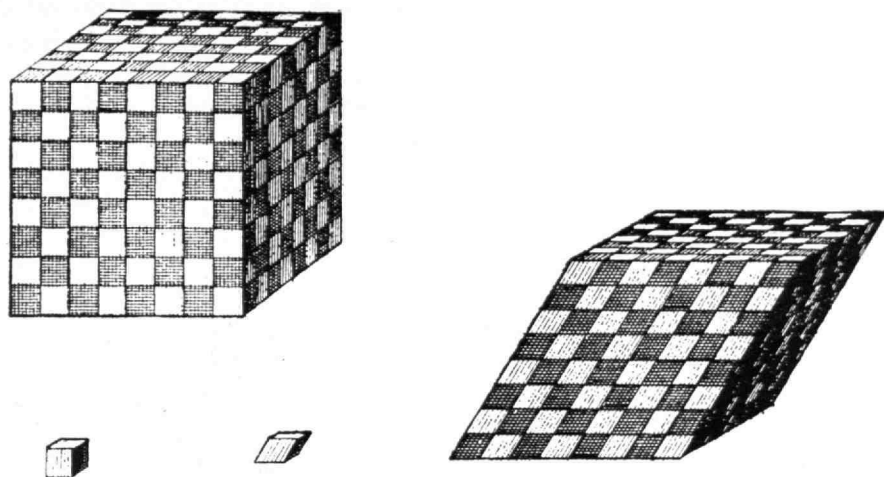
The beauty of alchemical mysticism attracted adherents long after it was obvious that it was not a fruitful guide (obvious in retrospect, that is). It was slowly replaced by the belief that eventually became the mainstream of chemistry that the qualities were dependent upon composition and that they were not dependent only on the units but also sometimes on the manner of combination. At first, however, the qualities needed an embodiment, and perhaps largely under the influence of miners, mercury and sulfur (the philosophical kinds, not the ordinary materials) were thought to account for most substances by their varied combination. Sulfur represented the inflammable principle, the soul, the fire of Aristotle, while mercury was the materialization of the fluidity principle. Paracelsus early in the Sixteenth Century methodized this viewpoint and added a third principle, salt; he also directed chemistry toward a useful practical purpose, medicine, and away from its domination by mystic philosophy. Salt, sulfur, and mercury—excellent examples of ionic, van der Waals, and metallic bonding; had diamond with its covalent bonding been added, all types of today's quantum theory of solids would have been represented. The problem was in the realm of solid-state physics, but there were no solid-state physicists in those days.

No physicist arose to meet the challenge, but chemists had to do something and so did practical smelters and assayers of ore. The inflammable principle, the reducing principle, the sulfur of Paracelsus, was supposed to be transferred from charcoal to a metal ore when the latter was converted to metal. It became the *terra pinguis*, the unctuous earth of J. J. Becher in 1667, and was elevated to that important chemical principle, phlogiston, by G. E. Stahl, a metallurgical chemist, in 1703. Very much of Eighteenth-Century chemistry revolved around the phlogiston theory and the degree to which this evanescent material was transferred from one substance to another in reaction. But the study of reactions was now being done systematically, and tables of affinity appeared—the first in 1718—putting substances in order of their affinity for each

other, each being able to displace those above it from compounds.

Though phlogiston had some of the chameleon-like variability of the alchemist's elusive elixir, it was responsible for metallicity and its loss left a calx (an oxide in today's terminology). The presence of an excess of it changed iron into steel, and still more into cast iron. Parallel with the phlogiston studies went an intensive study of the composition of matter, sparked to some extent by the desire to duplicate Chinese porcelain. The definition of element became something that could not be chemically broken down and it appeared that there were many elements, though not an infinite number. Analytical chemistry evolved from the assayer's ancient technique of extracting the noble metals in weighable metallic form, usually on the basis of ingenious pyrochemical reactions, and became broadly applicable when it was found in the Eighteenth Century that compounds of definite composition could be precipitated reproducibly by reaction in aqueous solution and weighed. This was accompanied by a growing interest in the role of gases and the rather sudden appreciation of the chemical role of atmospheric oxygen, which quickly demolished the phlogiston theory. The new chemical nomenclature of Lavoisier and his associates tied together all of the analytical data into a clear listing of the elements and their relationships in numerous natural and artificial compounds, and thereafter composition alone became the chemist's explanation for all of his phenomena. The chemist, the mineralogist, and the metallurgist were still almost the only people seriously interested in the nature of solids.

Looked at from today's viewpoint, it is obvious that the phlogistonists were right. The difference in properties between black brittle cuprite and shiny malleable copper *is* due to phlogiston: phlogiston is simply the valence electron in the conduction band of today's quantum theory. The phlogistonists did overlook the oxygen atom which trapped the electron, and this is a



The assembly of polyhedral parts as cubic and rhombohedral crystals (Grignon, *Essai de Physique sur le fer*, Paris, 1775).

pretty large thing to overlook, but they were right physically if not chemically. They had to use other atoms (composition) to manipulate the phlogiston; today we simply pump phlogiston through an electrolytic cell, add it to ions, and get metal. A ton of aluminum, it turns out, needs just about two ounces of phlogiston for its preparation!

After the development of analytical chemistry in the 1780's, very many of the age-old properties of metals and other materials were found to be associated with specific compositions, and even very minor amounts of impurities such as phosphorus or sulfur in iron were found sometimes to be associated with great physical changes. One of the first triumphs—again under inspiration from the Orient, in this case in the form of the Damascus sword—was the discovery that it was minute but varying amounts of carbon, a real material substance now classed as an element, that was responsible for the striking differences between wrought iron, steel, and cast iron.

After this, composition per se was, for a time, regarded as a sufficient explanation of the wondrous diversity of properties of substances. Analysis provided the basis for the classification of substances. After the atomic theory of Dalton (which was no more of an atomic theory than had existed for centuries but was a really fine quantitative theory of simple molecules) chemists' eyes were for a long time closed to compounds that were not simple. The reactions of metallurgy, which largely involve solid solutions, lost interest to the chemist, who now worked mostly with ionic compounds or aqueous solutions of them (or with organic molecules) and interpreted the simple ratios of atoms found by analysis as representing molecules. Superb quantitative proof of the existence of molecules was provided by the combining volumes of gases and by the kinetic theory of their PVT relations, but most of the chemist's precipitated compounds were actually in simple ratios only because of the geometric requirements of the crystal lattice. Physicists were of no help. If Nineteenth-Century physicists were interested in solids at all, they too talked about the relations of the mole-

cules, though molecules were often supposed to be spatially oriented (not on lattice points but sometimes within unit cells) to account for the anisotropic properties of crystals.

The introduction of the crystal makes me take another leap back in time. Crystals initially were simply bodies with a certain geometric external shape, and quartz was the archetype. They were brittle, commonly transparent.

There are few subjects better adapted to elegant treatment by the mathematical physicist than is crystallography, yet, although physical properties of crystals were often measured, crystallography did not really become part of physics until after x-ray diffraction. Nineteenth-century physicists showed an almost incredible restraint in speculating on the details of the atomic, or as they would call it, molecular, arrangements responsible for the symmetrical anisotropy of the shapes and properties of crystalline matter. The mineralogists, however, fairly early realized the value of crystal measurement in the identification of minerals. Though much had been done before, it was Linnaeus' desire for classification in the realm of natural history that gave the real impetus to the collection of data on crystal faces and their angles, and the seeking of a satisfactory model that would explain them in their diversity. The great Haiüy who was the first to develop the mathematics of the angular relationships did this on the basis of an earlier supposition that crystals were composed of aggregates of tiny polyhedra (called integrant molecules), with all faces that did not correspond to the plane faces of the unit arising from the removal of polyhedra in a simply stepped array of building blocks. Incidentally, he remarks that the similarity between different individual crystals of the same species is less evident than the similarity between different individuals of a biological species—a view that we find astonishing today with our mind on the perfect regularity of the space lattice as the main characteristic.

Haiüy explicitly disclaims the possibility of knowing the ultimate structure of matter, though he considered

the structural units definitely to be polyhedra within which the molecular interactions were different from those outside; it was a kind of geometric package, and had been arrived at by Haüy as by others before him simply on the basis of observations on the disparity between the cleavage and the growth faces of crystals. To our minds, the stacking of balls seems to provide a more physically meaningful model of simple crystals, though mathematically, of course, there need be no difference between the two. It is therefore particularly interesting to see that the first thoughts about the nature of crystals involved exactly this model. It was suggested by Thomas Harriot about 1599 though first published by Kepler in 1611 and developed particularly by Hooke and Huygens later in the Seventeenth Century. Hooke, for instance, showed that all of the surfaces of alum crystals could be matched by stacks of globular bullets arranged in close packing, and he suggested that sea salt is built of globules placed in a cubic arrangement. He saw the relation of stacking to the sixfold dendrite formation in snow, though in characteristic Hookian fashion he merely outlined a program of study and did not follow it through. Huygens used a similar model with spheroids to explain the cleavage and optical properties of calcite, but after him the ball model disappears, to be replaced with stacks of polyhedra.

Even more astonishing is the fact that when the stacking-of-spheres model is resurrected by the great Wollaston in 1812 and used to explain the nature of several bodies, including the alternate regular stacking of large and small spheres to account for rock salt, again it is rejected in favor of Haüy's approach. The polyhedra somehow seemed to lend themselves more readily to mathematics, and they were mathematically, though not physically, replaced somewhat later in the century by the more ideal point-group model of the mathematical crystallographers. Stacks of ball-shaped atoms came back again in a paper by Barlow in the 1880's—notice that it is the more pragmatic approach of the English, not the elegant mathematics of Continental physicists, that produced it. It was being well developed by Barlow and Pope, Sohncke and others, all of a chemical turn of mind, when x-ray diffraction suddenly provided the experimental handle to enable both the symmetry and the chemistry to be combined in a properly scientific scheme.

The first surprise, indeed it was a shock, was the realization that no molecules existed in simple ionic crystals. The relationship between the ball-like atoms and the stacking polyhedra of the unit cell was thereafter clear to every freshman. It is ironic that just as the ball model was vindicated, the atom itself lost all reality and we have now turned to the neat polyhedra of the Brillouin zone as the most reasonable model of the unit of the crystal. For the first time, the model is one which is neither a determining unit nor a dominating array, but results from the two-way interaction between unit and arrangement.

This brings me to the subject I am mainly interested in, metallurgy, for Nineteenth-Century metallurgy is

virtually a qualitative preparation for Twentieth-Century solid-state physics. Here, for the first time, the earlier qualitative speculation on the relation between structure and properties begins to take definite useful form. First, it was realized that the essence of crystallinity lies in internal order not in external form, and more important, that most solid inorganic bodies are composed of hosts of microcrystals. The knowledge that metals had a granular texture, of course, goes back to the earliest broken piece of metal, and the fracture test was the principal basis of selection and quality control for millennia. In the Eighteenth Century, Réaumur used experiments on fracture combined with Cartesian corpuscular philosophy to give the first good theory of steel, but it was not until the middle of the Nineteenth Century that the granular structure was experimentally shown to be microcrystalline. The nucleating observations occurred appropriately enough in the steelmaking town of Sheffield in England, almost exactly 100 years ago, when Henry Clifton Sorby, for the first time in history, prepared the surface of a sample of steel carefully enough so that the structure could be seen under a microscope without the distortions that had rendered the structure invisible to early microscopists.

The background of Sorby's use of acid to develop the structure is itself an interesting bit of history, for it has roots not only in the artist's etched prints and decoration of armor but also in the oriental "Damascus" sword, the etching of which led to the etching of meteorites. Sorby saw that metals did not crystallize under vibration—a long-lived myth—but were always finely polycrystalline. He saw that they could be distorted while maintaining crystallinity and would recrystallize either as a result of an allotropic transformation as in steel, or simply on heating after straining by cold work. He also identified most of the phases now known in steel, but he did not continue in the field very long, and it was left to other workers who took up the subject after 1880 to reveal the richness of structure in metals and alloys, and to associate the changes of structure with the properties that had been empirically discovered and long used. Slip bands were seen in 1896, and in 1900 their nature and significance were appreciated by Ewing and Rosenhain. Slip interference soon became the metallurgist's theory of hardening.

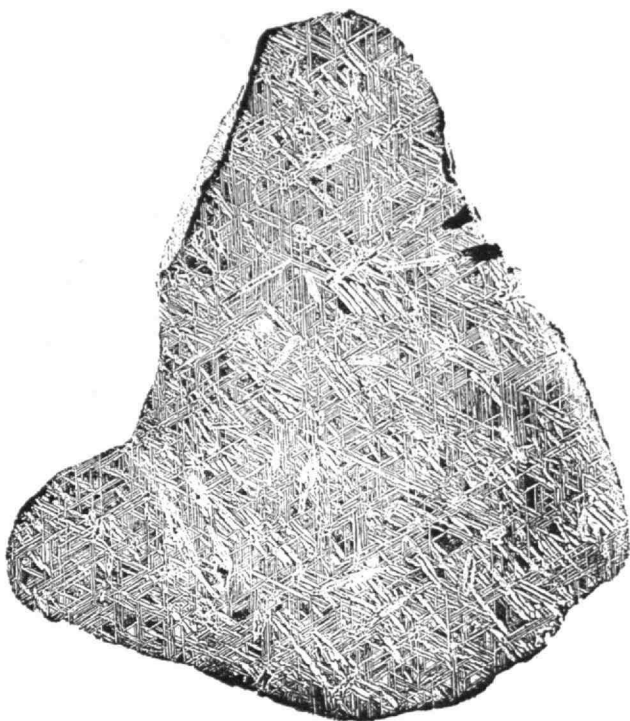
Long before physicists began to get interested in problems of deformation and the nature of grain boundaries, metallurgists knew the phenomena intimately though empirically, and had developed their own naïve little models to account for the behavior. Though through most of history the metallurgist's closest association has been with chemists, by the second decade of the Twentieth Century they were thinking in physical terms if not as physicists. Chemists had grown and studied metal crystals as curiosities for over a century, but it was the metallurgist, H. C. H. Carpenter, who first did significant mechanical tests on single crystals of metal, and it was the report of his work which triggered off G. I. Taylor's renewed inter-

est in deformation that culminated in the invention of the dislocation. Almost a century earlier, collaboration with a practical cutler in work on the alloys of steel (partly aimed at duplicating oriental Damascus steel) had helped to give Michael Faraday the sense of structure which so dominated his thinking.

I don't mean to say that metallurgists in the Nineteenth Century did not benefit from physics; indeed, their whole approach was always based upon a knowledge of college physics, the tamped-down general level of science which Derek Price properly regards as being the route through which science mainly influences technology. But it must be admitted that physicists were usually unable to work up interest in the complicated problems that concerned metallurgists. The metallurgist tends quite literally to enjoy the wide range of the behavior of metals, while the physicist will look only at those aspects that are ripe for understanding.

Faraday soon lost interest in metals, and it was a very good thing for science that he did. A few other physicists tried to look realistically at solids, but they had little following. There is the French physicist, Louis Savart, who in 1829, to explain the details of Chladni figures on vibrating plates, made some very acute comments on the structure of metals. He realized that normally there were assemblages of a vast number of little crystals packed together at random, but that preferred orientation would develop under special conditions of casting, working, and annealing. He observed the difference between the static and dynamic modulus of elasticity, and attributed changes of internal friction to structural relaxation. The elastic aftereffect attracted experimentalists, while Boltzmann and Maxwell provided characteristic theories, the former purely mathematical, the latter based on changing molecular aggregations. Others who were concerned with complicated structures in relation to physical properties were M. L. Frankenheim and particularly O. Lehmann, whose *Molekular Physik* (1889) is a fine museum of phenomena that depend upon crystalline perfection and imperfection, and he had a sense of form that was more that of a biologist than a physicist. This viewpoint, however, did not find its way into textbooks, not even the advanced ones which decided what things the discipline of physics should be concerned with.

Finally, no one who, like myself, has experienced the wonderful stimulation that came to metallurgy from the impingement of physics in the 1920's, and especially right after World War II, can be blind to results of the joining of two streams of development that had been to some extent separate. One cannot deplore the earlier separation, for neither field was ripe for profitable interaction. Recently, however, solid-state physics has advanced to the point of becoming a sepa-



This direct imprint of the Elbogen meteorite was made in 1813 by Widmanstätten and Schreibers.

rate profession, and physical metallurgy has become metal physics. Though both fields have gained competence and immense utility, they have perhaps become less exciting, for the diversity of material behavior has been reduced to unitary phenomena that are well understood, at least "in principle." The framework for studying complexity is still lacking, and, deplorably, the study of it is not encouraged in most universities.

Metallurgists trained in the 1920's, as I was, saw in the richness of visible microstructure a key to the understanding of most of the phenomena that their predecessors had discovered and used. Most developments since then have been on an atomic scale, especially flowing from the application of that marvelous tool, x-ray diffraction. As a microscopist, however, I have been delighted to see the recent return to direct observation of the structures of irregular aggregates of imperfections with the electron microscope. Great things are certainly stirring, but I have a little feeling that with metallurgy and physics now so close together, the new viewpoint that will trigger off the next wave of excitement and advance will have to come from outside. Somehow, I think it must be a concern with far more complex things than have been allowed in the domain of respectable physics in the past. I wouldn't be entirely surprised if it comes from biology when the high fashion of biology returns from the molecule to the organism. It will certainly have some of the old natural historian's view in it, and it may even have a big dose of something as unscientific as art, for of all people the artist seems to be best able to make significant, if not always precise, statements about very complex interrelationships.



ESCAPE

The United States was founded at a time when philosophers were beginning to believe in the perfectability of mankind. Ever since Benjamin Franklin and Thomas Jefferson, Americans have been inclined to put their faith in a combination of democracy and science as a sure formula for human progress.

Today that faith burns much less bright. Since the Second World War it has seemed to many, and especially to scientists, that the faith was dimmed by the mushroom cloud of the atomic bomb. The scientists who found themselves, to their great surprise, caught up in the political troubles of the contemporary world are tempted to blame their fate on their success in discovering nuclear fission: they see their tragedy, like that of Prometheus, as the result of seizing the secrets of the gods. But it seems more realistic to remind them that their own faith in inevitable progress had been dampened before Hiroshima—during the Great Depression or even before.

The earlier creed of progress had two main articles of faith, one relating to the progress of science, the other to the progress of society. The first was that men's desire for material benefits would lead society to support the advancement of science and technology, just as the profit motive would encourage the development of the economy. The second was the corollary that the advancement of science would lead society toward desirable purposes, including political freedom.

The depression gave the general public reason to doubt these beliefs, as many scientists and philosophers had already come to do. After economists and politi-

*Is the scientific community a new estate, so powerful
it cannot be controlled by our constitutional system?*

TO THE ENDLESS FRONTIER

By Don K. Price

Dean, Graduate School of Public Administration, Harvard University

cians lost their confidence that the individual profit motive would automatically guarantee economic progress, and that technological innovation would necessarily further social welfare, it became easier for the general public to share the skepticism of scientists. The leaders of the scientific world, of course, had already come to understand that science makes progress less by the effort of inventors to find solutions for the practical problems of industry or government, than by the formulation of abstract theory and the search for basic knowledge. And they had much earlier given up their faith that science was certain to further either divine purpose or political progress.

At the end of the Second World War, the scientists' skepticism became a basis not for despair, but for vigorous action to guarantee the progress of science. Under the leadership of Vannevar Bush [16] the scientists undertook to teach the nation that basic research would not be produced automatically by the efforts of industry or government to apply science and technology to their own purposes, and that as a matter of policy the government should support basic research without regard to its application. The United States had

been weak in basic science, and had had to rely on Europe for the fundamental knowledge that guided the development of the spectacular new weapons during the war. Now, knowing that "basic research is the pacemaker of technological progress," the United States must provide support from government funds for the advancement of fundamental science. This argument, presented to President Roosevelt by Dr. Bush in his famous report, *Science the Endless Frontier*, reversed the traditional policy of the United States in two ways: it persuaded universities and private research institutions that they had to ask the government for financial aid, and it persuaded the government that basic science, as well as applied research, deserved support.

But although the report abandoned the traditional faith in automatic progress with respect to science, and proposed deliberate governmental policies to encourage that progress, it did not undertake to deal with the second and more general aspect of the problem—progress in social and political affairs. The relation of science to political purposes was set aside with the assurance that the progress of science is essential to "our health, prosperity, and security as a nation," and the disclaimer that science alone would provide no panacea for social problems.

The Bush report thus dealt—as, of course, Dr. Bush was asked by the President to do—with only half of the total problem of science in its relation to politics. On that half of the problem, it taught its lesson well, and the electorate learned it thoroughly. The results can be

ILLUSTRATIONS BY JERRY DADDS

This article is the first chapter of Dean Price's new book, The Scientific Estate, published by the Belknap Press of Harvard University Press. It is reprinted here with the permission of the publisher.



graded, in a crude way, by looking at what Congress was persuaded science is worth to the taxpayer: we are spending more dollars today on research and development than the entire federal budget before Pearl Harbor. If the lesson was an incomplete one, no one should single out the scientists for blame. Dr. Bush was not asked by the President to revise our political philosophy, but only to present a plan for the support of science. It is curious, in retrospect, that the political questions were not raised, but the fault was not that of the scientists, but of the politicians and political scientists. There were, indeed, some arguments about such questions as how the officials should be appointed who were to make grants to scientists, and what the procedures should be for accounting and overhead payments. But these were applied details, and hardly anyone stopped to ask the fundamental question: How is science, with all its new power, to be related to our political purposes and values, and to our economic and constitutional system?

By ignoring this question, we have been trying to escape to science as an endless frontier, and to turn our backs on the more difficult problems that it has produced.

For more than a decade, this escape seemed a sound strategy for science. Plenty of money was being provided, although there were indeed some minor inconveniences, as well as some worries in principle, about the way in which basic research was subordinated to certain applied programs. But then it began to be clear, in two ways, that troubles were sure to arise in the relationship between science and politics. The first way has now become clear to everyone in practice; the second is more theoretical, and therefore more important, but less obvious.

The practical trouble has arisen because practical politicians came to doubt that the identity of purpose between government and the scientific community should be taken for granted. "Health, prosperity, and security"—it was an argument, in a more sophisticated

form, that what's good for science is good for the nation. This is surely true, in a general sense, but it is no longer completely persuasive as unfriendly members of Congress begin to look for conflicts of interest between the scientific community and the nation as a whole.

Conflicts of interest appear first in petty problems, such as those of accounting for federal grants to universities. But then they appear in graver problems, like the degree to which scientists as such should have a voice in policy decisions, or government should control the direction of research and the use of its results. The simple reassurance that science is bound to be good for you is not likely to be adequate, especially in view of the new potentialities for both good and evil of the biological and social, as well as the physical, sciences. Our popular worries about intercontinental missiles and radiation fallout, in which our alarm can be directed against an alien enemy, are bad enough. But to these worries we have added the fear that scientists are about to use chemistry to poison our crops and rivers, biology to meddle with our heredity, and psychology to manipulate our ideas and our personality.

So we are about to reach the point when both scientists and politicians begin to worry not merely about specific issues, but about the theoretical status of science in our political and constitutional system, and no longer rely on the assumption—which was acceptable enough to the general public when Dr. Bush presented his memorable report—that science and democracy are natural allies. Especially since some scientists have never believed it: some have been profoundly suspicious of the American version of democratic politics, rather preferring the status of science in the more conservative and traditional societies of Western Europe, and a few have been persuaded that science would prosper better under some form of socialism.

But most scientists, of course, like most politicians, have not thought very much about the problem at all. Indeed, any reasonable foreign observer would be obliged to conclude that we have socialized our science



at best in a fit of absence of mind, and at worst with the purpose of subordinating it to the purposes of military power.

Accordingly, the scientific community and the United States generally are in even deeper trouble for their lack of a theory of the politics of science, than for their failure to solve practical problems of organization or policy. The nation that was born of the first effort in history to marry scientific and political ideas—the political heir of Franklin and Jefferson—is apt to speak of the relationship of science and politics with an air of apology, while throughout Asia and Africa the missionaries of Marxism teach the developing intelligentsia that the Communist system is the only approach to politics that is firmly grounded on the scientific method.

The clearest example of this contrast, as it has percolated down from the scholarly elite to the general public, may be found in science fiction. This is a form of literature unwisely neglected by students of politics. On something like the theory that if I could write a nation's songs I would be glad to let someone else write its laws, I am inclined to think that it is the space cadets of the comic strips—and their fictional counterparts back to Jules Verne or even Daedalus—who have fired our enthusiasm for the race with the Russians to the moon. That enthusiasm is certainly shared on both sides of the Iron Curtain. But with a difference, and a difference that may be more important to the future of our political system than the amount of money that we spend on space exploration.

The difference is that the Soviet space cadet, in sharp contrast to his opposite number in Western science fiction, seems to be very conscious not only that he is in a race for prestige or power with another country, but that he has discovered the key to the use of the scientific method in human affairs. This is the materialist dialectic, which is supposed not merely to let the Communist system make the best use of science in technical matters, but to give the scientific intellect a gen-

erally dominant role in the society of the future.

This notion began to appear in Soviet space fiction long before the first Sputnik. Forty years ago Aleksei Tolstoi, with some technical help from the pioneering rocket engineer Tsiolkovski, used a new propellant to put a heroic Red Army man on Mars, where he proceeded to help organize a proletarian revolution against a decadent Martian society. More recently, it has become even clearer that the Soviet conquest of space will be a means of extending to the cosmos the spread of Marxist philosophy. Thus, as one spaceship rushes through the void to its first meeting with beings from another solar system, the hero reassures his colleagues that sympathetic communication will surely be possible: "Thought, no matter where it is found, will inevitably be based on mathematical and dialectical logic." (Incidentally, the hero does not rely entirely on such spiritual comfort, for he goes on to issue tranquilizers to all hands on board.) And his comrade replies with a sententious expression of confidence that they will be congenial with the beings they are about to meet, since it is inevitable that on other worlds, as on the Earth, "humanity has been able to harness the forces of Nature on a cosmic scale only after reaching the highest stage of the communist society."

In the West, of course, the science fiction hero is a good deal less sure that science is about to bring the cosmos to a state of perfection. As Isaac Asimov has noted, most contemporary science fiction in America is not utopian, but anti-utopian. If the hero is not full of complexes from his infancy or frustrated by romantic difficulties, he is likely to be upset by the feeling that the social system in which he lives is not all it should be. The clear-eyed young hero in his space suit (like the clear-eyed cowboy or the earlier pioneers and pathfinders) is all too likely to be betrayed by selfishness or weakness in high places. Or in the more recent and more apocalyptic stories, the hero, if any, is likely to be struggling in a world that is about to be ruined, or has been ruined, by the inability of the politicians to



understand and control the powers released to mankind by modern science.

A generation ago, the popular utopias were mainly in the tradition of Edward Bellamy's *Looking Backward*, which in turn was still in the tradition of Francis Bacon's *New Atlantis*: the world remade to the heart's desire by the rationalism and the power of science. But today, the few scientific utopias are not calculated to inspire much hope for humanity. Even a Marxist scientist like J. D. Bernal finds some of them repulsive because "a lack of freedom consequent on perfect organization" leads to a society in which the "Utopian seems, notwithstanding his health, beauty, and affability, to partake too much of the robot and the prig." The anti-utopian theme, on the other hand, appears in serious pronouncements by scientists as well as in science fiction; even at meetings of scientific societies, speeches are likely to be made gloomily predicting disaster from our advance in scientific knowledge, and calling for a revival of something like traditional faith.

And if the utopias have changed, so have the horror stories. A generation or two ago the traditional symbol of political oppression had not changed since before the days of Thomas Jefferson: it was the rack of the Inquisition. If you were brought up on *Westward Ho!* and Browning's dramatic monologues, to say nothing of Jefferson and Macaulay and later political historians in the liberal tradition, you were likely to believe that the main historic threat to human freedom had been averted from the English-speaking world by the defeat of the Armada, and destroyed in America by the disestablishment of the church in Virginia. About all that was necessary to perfect the possibility of human freedom (one could learn from *Huckleberry Finn* or *Elmer Gantry*) was to destroy the last vestiges of enforced conformity in our society.

But within a few decades, the popular symbol of oppression had changed completely. The techniques of torture in *Westward Ho!* had been replaced by the more scientific methods of Orwell's *1984* or Zamyatin's

We. A society founded on technology, rather than superstition, had become the most plausible system of tyranny.

The difference between the democratic and Communist camps in the popular attitude toward the political significance of science might be dismissed as the product of frivolous fiction if it did not also appear in the writings of eminent scientists. It is tempting to hope that the Soviet scientists are really dedicated only to their science, and eager to join in an international community with their Western colleagues. But it is hard to write off completely the official point of view, as expressed by Academician S. I. Vavilov, that Lenin had correctly comprehended the philosophical significance of science in general, and physics in particular, when he had "pointed out that the crisis in physics could be overcome by mastering the science of dialectical materialism. This provided a sure way for physics to surmount every kind of crisis and develop further." As a result, it is supposed to be the obligation of Soviet physicists to take the dialectic as their guide not only in their approach to politics and philosophy, but also to physics itself.

In practice, all the evidence suggests that this has very little to do with the way physicists actually work in their laboratories; if they make a few rhetorical gestures in the direction of political orthodoxy in an introductory paragraph of a scientific paper, they can write as they please on scientific subjects. But Marxist dialectic is still the orthodoxy; like other authoritarian orthodoxies, it cannot stamp out skepticism and cynicism, but it can stamp out *open* dissent.

The scientists of democratic nations, even if they are ardent anti-Communists, take no such confident view of the role of science in their political systems. Some of this pessimism comes out when leading scientists take to science fiction as a medium. Fred Hoyle, the Cambridge University astronomer, had his hero in *The Black Cloud* sum up the British political system thus: "Politicians at the top, then the military, and the real brains at the bottom . . . We're living in a society that contains a monstrous contradiction, modern in its technology but archaic in its social organization . . . We (scientists) do the thinking for an archaic crowd of nit-wits and allow ourselves to be pushed around by 'em in the bargain." And the late Leo Szilard, University of Chicago physicist, seems to sum up his view of American politics when he has his delightful dolphins, who are surely the most engaging heroes in recent science fiction, tell why politicians fail to solve modern problems:

Political issues were often complex, but they were rarely anywhere as deep as the scientific problems which had been solved . . . with amazing rapidity because they had been constantly exposed to discussion among scientists, and thus it appeared reasonable to expect that the solution of political problems could be greatly speeded up also if they were subjected to the *same kind* of discussion. The discussions of political problems by politicians were much less productive, because they differed in one important respect from the discussions of scientific prob-

lems by scientists: When a scientist says something, his colleagues must ask themselves only whether it is true. When a politician says something, his colleagues must first of all ask, "Why does he say it?"

The same themes come out when scientists undertake to write explicitly about the relation of science to politics. The difference that Dr. Szilard's dolphins noted between science and politics is indeed a major difference, and one that could be a starting point for a political theory. Why, indeed, do politicians, unlike scientists, have to worry about the unstated purposes of another politician, or another government? But a great many scientists do not like to follow up on the implications of that question. It is more satisfying to argue that the straightforward scientific approach of the scientist should replace the devious and prejudiced ways of politicians, and to wonder whether the scientific revolution has indeed not made obsolete the institutions of modern democracy, or at least the present way in which they are organized and managed.

Thus a federal research administrator may complain of the scientists' lack of influence by comparison with lawyers and politicians, and argue that the federal government should have a Secretary of Science to mobilize the nation's scientific resources and co-ordinate all its policies from a scientific point of view. Or a great German physicist and Nobel prize winner may summon his colleagues to international discussions of their difference in ideology, and to international co-operation to end the race in atomic armaments, arguing that they need to apply to politics the methods of thinking used successfully in physics—"to think out these problems, which have arisen out of our research, in our own simple realistic manner." And one of his colleagues in those international discussions, Dr. Eugene Rabinowitch, poses the central problem directly: "The capacity of the democratic, representative systems of government to cope with the problems raised by the scientific revolution is in question."

Dr. Szilard and Dr. Rabinowitch probably represent a distinct minority of American scientists, rather than the majority who are (or wish they were) consultants to corporations and members of Rotary Clubs, and who do not trouble their heads about political theory. But the question that this minority poses about the relation of representative government to the scientific revolution cannot be brushed off lightly. For the scientific revolution has changed not only the basic sciences themselves, but their consequent ability to produce new technology; it is this ability that has led to their new financial support by government, and changed the nature of military strategy and even of the economic and political system. It is accordingly very difficult, when speaking of the social effects of science, to distinguish it from technology; even those who keep accounts on government expenditures for research and development admit that the distinction they make between basic research and applied technology is not a precise boundary.

The relationship of the scientific and technological revolution to our system of representative government is a cogent question, both in its own right and because it has been raised with such urgency not only by those who seek to strengthen the political influence of scientists, but by others who are worried about the way in which such influence may be used.

During the early 1960's, it was a rare scientific meeting that failed to discuss two pronouncements on the relation of science to politics. The first was Sir Charles Snow's vivid story about the wartime rivalry of Tizard and Lindemann as scientific advisers to the British government. That "cautionary tale" warned us that democracy was in danger from the great gulf in understanding between the Two Cultures of science and the humanities, and from any possible monopoly on scientific advice to high political authority. The second was the farewell address of President Eisenhower, warning the nation that its public policy might "become the captive of a scientific-technological elite."

It is easy to appreciate why President Eisenhower felt as strongly as he did. His administration had started out to cut back on expenditures for research and development, but had ended by quadrupling them. This increase was by no means for defense alone; during his eight years in office the Congress multiplied the appropriations for the National Institutes of Health more than ninefold, giving them each year more than he had recommended. Science seemed clearly to be getting out of hand. It was almost enough to make one try to apply to the budgeting process the theory of Henry Adams that science, as it becomes more abstract, increases in geometrical progression the physical power that it produces.

The President's statement was a great shock to the scientists, especially to those who had been working with the administration rather than criticizing it in the columns of the *Bulletin of the Atomic Scientists*. President Eisenhower, indeed, quickly explained that he was not talking about science in general, but only those parts allied with military and industrial power. Nevertheless, to the typical American scientist who still believed that science had helped to liberate man from ancient tyrannies, it was disconcerting to be told by a conservative President that he had become a member of a new priesthood allied with military power.

Yet it had begun to seem evident to a great many administrators and politicians that science had become something very close to an *establishment*, in the old and proper sense of that word: a set of institutions supported by tax funds, but largely on faith, and without direct responsibility to political control. The terms under which this support is now given to science do not seem to many politicians to fit into the traditional ideas of Jeffersonian democracy.

From the point of view of scientists and university administrators, on the other hand, the growing dependence of science on government brings a great many problems, especially the danger of increasing govern-

ment control over universities. It is hard to turn money down, but more and more scientific spokesmen are beginning to worry about the conditions that come with it. From the point of view of government, the sentiment in Congress now seems to be considerably more critical of the terms on which money is provided for scientific research. Edward Gibbon summed up the cynical Eighteenth-Century attitude toward a religious establishment by remarking that all religions were "considered by the people, as equally true; by the philosopher, as equally false; and by the magistrate, as equally useful." And now, it seems that all sciences are considered by their professors, as equally significant; by the politicians, as equally incomprehensible; and by the military, as equally expensive.

So we are beginning to observe in the Congressional attitude toward science some of the symptoms of friction between an establishment and a secular government. The symptoms showed up, for example, in Congressman L. H. Fountain's investigations of the National Institutes of Health, wherein he sought reform by uncovering abuses in the administration of the cloistered but tax-supported laboratories. And they showed up in Congressman Wright Patman's attacks on the tax-exempt foundations—institutions which by a modern kind of mortmain give science a range of political initiative outside the control of politics.

These attacks do not get at the main issues. They have so far been only a minor nuisance to scientific institutions, with an effect measured mainly in the time taken to fill out accounting forms. But they are a threat because they may reflect a more fundamental uneasiness in the intellectual as well as the political world. This is an uneasiness not merely about the terms of the financial relationship between government and science, but about the question whether the growing influence of science can be kept compatible with representative government. It is, in short, the same question asked by Dr. Rabinowitch—can democratic government cope with problems raised by the scientific revolution?—but from the opposite point of view.

These attitudes, as yet, may have very little to do with the way most American scientists think, either on or off duty, and practically nothing to do with the amount of money their laboratories get in government grants. They are only a small cloud on the intellectual and political horizon of the United States. But they correspond to a much greater intellectual disturbance, over the past century and a half, in Europe, where the political faith in the alliance of science and reason with free government that was characteristic of the Enlightenment gave way in the late Nineteenth Century to various forms of scholarly despair. In America, a faith in the political rationalism of the Enlightenment tended to persist in the political thinking of scientists, even after the depression shook their confidence in the inevitability of progress. Right up to the present, American scientists have shown singularly little interest in either the conservative political theorists who tell them that

scientists cannot deal with basic values or solve the major human problems, or the radical theorists who tell them that science can do so if it will only join in a political system, like Marxism, that will give it real power over society.

Even the strongest critics of the government and its scientific policies—for example, many of the contributors to the *Bulletin of the Atomic Scientists*—are surprisingly traditional in their approach to the political system. They may question the capacity of our representative institutions to cope with the scientific revolution, but they tend to propose as remedies more international good will and co-operation, adequate scientific education of political leaders and the electorate, and unbiased scientific advice for members of Congress.

It is hard to quarrel with any of these ideas. But they are a little like the remedy that was most often proposed for corruption in government during the late Nineteenth Century: more good men should go into politics. That exhortation surely did some good, but probably less than the effort to adjust our political and economic institutions to the realities of the industrial revolution. That adjustment required a great many changes, by Congress and the judiciary and administrators, but it did not follow the prescriptions of any of the single-minded political prophets. It came instead from a new way of looking at the problem: we gave up thinking about politics merely in terms of the formal Constitutional system, which had been based on an analogy with Newtonian thought—a mechanistic system of checks and balances. In the latter part of the Nineteenth Century, students of politics (if they had not given up their interest in science) might have noted with interest a new analogy: as science penetrated the structure of the molecule, and identified its elements, politicians were becoming preoccupied with the elements of politics—with parties and economic classes and pressure groups—as well as its mechanistic Constitutional balances.

The scientific revolution in nuclear physics and in such fields as genetics is carrying us into a third stage of complexity. That revolution seems certain to have a more radical effect on our political institutions than did the industrial revolution, for a good many reasons. Let us note three of them.

□ *The scientific revolution is moving the public and private sectors closer together.*

During the industrial revolution, the most dynamic economic interests were more or less independent of the political system. They might depend on it, as many American corporations did by relying on tariff protection, and they might try with some success to control it, but they were not incorporated into its administrative system, they did not receive support from taxation, and the main directions of their new enterprise were controlled by their owners and managers. Today, our national policy assumes that a great deal of our new enterprise is likely to follow from technological developments financed by the government and directed in



response to government policy; and many of our most dynamic industries are largely or entirely dependent on doing business with the government through a subordinate relationship that has little resemblance to the traditional market economy.

□ *The scientific revolution is bringing a new order of complexity into the administration of public affairs.*

The industrial revolution brought its complexities, and relied heavily on new forms of expertise, but it did not challenge the assumption that the owner or manager, even without scientific knowledge, was able to control the policies of a business. And the same general belief was fundamental to our governmental system: the key ideas, if not the lesser details, could be understood by the legislature and debated before the public, and thus controlled by a chain of public responsibility. In one sense this was never true; in another and more fundamental sense, I think it is still true. But it is much less apparently true today than it was, and a great many more people doubt it. The great issues of life and death, many people fear, are now so technically abstruse that they must be decided in secret by the few who have the ability to understand scientific complexities. We were already worrying about the alleged predominance of the executive over the legislature; now we worry lest even our elected executives cannot really understand what they are doing, lest they are only a façade that conceals the power of the scientists—many of whom are not even full-time officials, but have a primary loyalty to some university or corporation—who really control the decisions. If (as I believe) this is not really true, it is nevertheless true that the scientific revolution has upset our popular ideas about the way in which policies are initiated and adopted, and in which politicians can control them and be held responsible for them. We have to reconsider our basic ideas about the processes of political responsibility.

□ *The scientific revolution is upsetting our system of checks and balances.*

From a moral or ethical point of view, the industrial revolution raised problems that were relatively simple. Everyone admitted that it was possible for economic interests to control politics, but the remedy seemed to be clear: regulate business to prevent abuses, and keep selfish business interests out of the political process. This seemed clearly the basic formula for dealing with

the obvious conflict of the public interest with the special interests of business. And the formula of separation of business and government was analogous in a comforting way to the formula for the separation of church and state. A church that was not dependent on government support was able to provide an independent source of moral judgment which could help to control the ethical standards of our politics and our business. As the problems began to seem a bit complex for unaided theological opinion, the universities began to provide an additional source of more scientific, but equally independent, advice to the public on the basic value judgments that should govern our policies. This was the fundamental system of checks and balances within our society: the check on practical political affairs imposed by sources of utterly independent criticism, based on a system of values that was not corrupted by the political competition for wealth or power.

But the scientific revolution seems to threaten to destroy this safeguard in two ways: First, it has gradually weakened the moral authority of religious institutions by the critical skepticism that it has made predominant in Western intellectual life, most notably in the universities. Second, it has made the universities themselves financially dependent on government, and involved them deeply in the political process. Thus, after helping to disestablish churches and free most universities from ecclesiastical control, science has now made those universities dependent on a new form of establishment, in the guise of government grants, and allied them more closely with a military power that is capable of unlimited destruction.

These three developments make some of our traditional reactions—our automatic political reflexes—unreliable in dealing with our present problems. We are automatically against socialism, but we do not know how to deal with an extension of governmental power over the economy that technically leaves ownership in private hands. It is almost an instinct with us to distrust the political bosses who, by controlling the votes of the ignorant masses, seek personal profit or power without accepting official responsibility. But we do not know how to deal with irresponsible influence that comes from status in the highest sanhedrin of science, untainted by any desire for personal profit. And we are fanatically against the public support of any institutions that might impose religious values on public policy, but when the institutions of organized skepticism tell us what science believes or how much money science needs, we have no reliable procedure for questioning their infallibility, or even for criticizing their budgets.

Science has thus given our political evolution a reverse twist. It has brought us back to a set of political problems that we thought we had disposed of forever by simple Constitutional principles. These are the problems of dealing not only with territorial subdivisions of government, and not only with economic interests and

classes, but also with various groups of citizens which are separated from each other by very different types of education and ways of thinking and sets of ideals. This was the problem of the medieval estates.

The three estates of the realm, whose customary privileges grew into constitutional functions, were the clergy, the nobility, and the burgesses—those who taught, those who fought, and those who bought and sold. In our impatience with privilege at the time of the American Revolution, we abolished the estates in our political system so thoroughly that we have almost forgotten what the word meant. To abolish the first estate, we disestablished the church and provided secular education through local governments. To abolish the second, we forbade titles of nobility, made the military subordinate to civil authority, and relied on a popular militia rather than a standing army. To abolish the third, we did away with property qualifications on voting and exalted freedom of contract and competition above legislative interference.

But now the results of scientific advance have been to require federal support of education and the appropriation of a tithe of the federal budget for research and development, to set up the most powerful and professional military force in history, and to make free competition a minor factor in the relationship to government of some of the major segments of the economy.

Thus we are left to face the second half of the problem which we were afraid to face during the depression, and tried to escape at the end of the Second World War: the necessity for discovering a new basis for relating our science to our political purposes. We learned half of our lesson from the scientists: the lesson that we could not have a first-rate scientific establishment if we did not understand that first-rate science depended on fundamental theoretical work and required the support of basic research for its own sake, and not merely as a by-product of applied science. Now the outlines of the second, or political, half of our problem are becoming more clear. Basic science as such became steadily more powerful as it freed itself from the constraints of values and purposes. As an institution in society, it had to free itself in an analogous way from subordination to the applied purposes of the industrial corporation or the government bureau or the military service. And in the unpredictability of its progress it challenges the old notion that in matters of public policy the scientist must be controlled completely by purposes defined by politicians. So we must face the possibility that science will no longer serve as a docile instrument toward purposes that are implicit in a system of automatic economic progress, or even toward purposes that are defined for scientists by business and political leaders. In short, we can no longer take it for granted that scientists will be “on tap but not on top.”

Accordingly, we need to consider not only the practical relation of scientific institutions to the economy

CHANGING ORGANIZATIONS

B. F. Herzog



Bureaucracy is outmoded and the times portend a future of ever transient work systems—and of rootless lives

By Warren G. Bennis, '55

This article is a condensation of the first Douglas Murray McGregor Memorial Lecture given by Dr. Bennis, Professor of Management at M.I.T., at the 1965 Convocation of Alumni of M.I.T.'s Alfred P. Sloan Fellowship Program. Some of the ideas expressed here are elaborated further in Professor Bennis' new book, also entitled Changing Organizations, published this year by McGraw-Hill. Another lecturer at the convocation was Thomas J. Watson, Jr., Chairman of the Board of IBM, and in the following article, "The Business of Peace," he discusses the political obligations of international corporations.

There is a new rapport between academician and the man of affairs: Left—At the 1965 Convocation of Sloan Fellows at M.I.T. a conversation among Dean Emeritus E. P. Brooks, '17, of the Sloan School of Management; Dean Robert L. Bishop of the School of Humanities and Social Science; and Hermann J. Abs, of the Deutsche Bank AG, Frankfurt (Main).

A foreign visitor in Boston once walked up to an American sailor and asked why the ships of the latter's country were built to last for only a short time. According to the foreign tourist, "The sailor answered without hesitation that the art of navigation is making such rapid progress that the finest ship would become obsolete if it lasted beyond a few years. In these words, which fell accidentally from an uneducated man, I began to recognize the general and systematic idea upon which your great people direct all their concerns."

The visitor was that shrewd observer of American morals and manners, Alexis de Tocqueville. The year was 1835, but he caught the central theme of our country, its preoccupation, its *obsession* with change. One thing that is new since de Tocqueville's time is the prevalence of newness, the changing scale and scope of change itself, so that, as Oppenheimer has said, ". . . the world alters as we walk in it, so that the years of man's life measure not some small growth or rearrangement or moderation of what was learned in childhood, but a great upheaval."

We are all aware of the momentum of the Scientific Revolution, moving like a juggernaut, transforming or ossifying everything in its way. Its magnitude, its scale, its accelerating rate, to say nothing of its consequences, are truly staggering. By 1980 it will cut even a wider path and require an even wider berth, for in that year the government alone will spend close to 35 billion dollars for research and development: 10 billion for arms and arms control, 7 billion for basic research, and 18 billion on vast civilian welfare programs and new technology.

"Everything nailed down is coming loose," an historian said recently, and it does seem that no exaggeration, no hyperbole, no outrage can appraise re-

alistically the extent and pace which modernization involves. It takes only a year or two for the exaggerations to come true. Nothing will remain in the next 10 years. Or there will be twice as much of it.

How will these changes taking place in our society influence human organizations? First of all, we should consider the dominant form of human organization employed throughout the industrial world. We spend all of our working day in it and a great deal of our non-working day. It is a unique and extremely durable arrangement called "bureaucracy."

As I use the term here, bureaucracy is a social invention, perfected during the industrial revolution to organize and direct the activities of the business firm. Today it is also the prevailing and supreme type of organization wherever people direct concerted effort toward the achievement of some goal. This holds for university systems, for hospitals, for large voluntary organizations, and for governmental organizations.

Corsica, according to Gibbon, is much easier to deplore than to describe. The same holds true for bureaucracy. Basically, it is a system that relies exclusively on the power to influence through rules, reason, and the law. Max Weber, a German sociologist who developed the theory of bureaucracy around the turn of the century, once described it thus:

Bureaucracy is like a modern judge who is a vending machine into which the pleadings are inserted together with the fee and which then disgorges the judgment together with its reasons mechanically derived from the code.

The bureaucratic "machine model" that Weber outlined was developed as a reaction against the personal subjugation, nepotism, cruelty, and the capricious and subjective judgments that passed for managerial practices in the early days of the industrial revolution. The true hope for man, it was

thought, lay in his ability to rationalize, to calculate, to use his head as well as his hands and heart. Bureaucracy emerged out of the need for more predictability, order, and precision. It was an organization ideally suited to the values of the Victorian Empire.

It is my premise that the bureaucratic form of organization is out of joint with contemporary realities; that emerging shapes, patterns, and models promise drastic changes in the conduct of the corporation and of managerial practices in general. In the next 25 to 50 years we should witness and participate in the end of bureaucracy as we know it and the rise of new social systems better suited to Twentieth Century demands of industrialization.

I see two main reasons for the changes in organizational life. One involves the population and knowledge explosions. The other is more subtle and muted, perhaps less significant; but for me, it is profoundly exciting. It is not easy to designate. It has to do with man's individual historical quest for self-awareness, for using reason to achieve and stretch his potentialities, his possibilities. I think that this deliberate self-analysis has spread to large and complex social systems, to organizations.

Over the last two decades there has been a dramatic upsurge of this spirit of inquiry. At new depths and over a wider range of affairs, organizations are opening their operations to self-inquiry and to analysis. This really involves two parallel shifts in values and outlooks, between the men who make history and the men who make knowledge. One change is the scientist's realization of his affinity with men of affairs, and the other is the latter's receptivity and new-found respect for men of knowledge. I call this new development "*organizational revitalization*," a complex social process that involves a deliberate and self-conscious examination of organizational behavior and a collaborative relationship between managers and scientists to improve performance.

This development is unprecedented. Never before in history or in any society has man in his organizational context so willingly searched, scrutinized, examined, inspected, or contemplated—for meaning, for purpose, for improvement.

This shift in outlook has taken a good deal of courage. The manager has had to shake off old prejudices about "eggheads" and "long-hair" intellectuals. More important, he has had to make himself and his organization vulnerable and receptive to external sources, and to new, unexpected, even unwanted information. The academician has had to shed some of his natural hesitations. Scholarly conservatism is admirable, except to hide behind, and for a long time caution was a defense against reality.

An upsurge of the spirit of inquiry: Right—Managers attend a special M.I.T. seminar given by Professor Edgar H. Schein.

The field of management education is a case in point; until recently, not only was it disregarded by large portions of the American public, but also it was unknown to or snubbed by the academic establishment. There, management education and research was regarded at best with dark suspicion, as if contact with the world of reality—particularly monetary realities—was equivalent to a dreadful form of pollution. In fact, historically academic man has taken one of two stances toward The Establishment, *any* Establishment: that of a rebellious critic or of a withdrawn snob. The rebel can be “bought,” but only at paperback book stores under such titles as *The Power Elite*, *The Lonely Crowd*, *The Organization Man*, *Hidden Persuaders*, *Tyranny of Testing*, and many others.

The withdrawn stance can be observed in some of our American universities, but less so these days. It is still the prevailing attitude, though, in many European universities. There, the university seems intent to preserve the monastic ethos of its medieval origins, offering a false but lulling security to its inmates and sapping the curriculum of virility and relevance. Max Beerbohm’s whimsical and idyllic fantasy of Oxford, *Zuleika Dobson*, dramatizes this:

It is this mild, miasmal air, not less than the grey beauty and the gravity of the buildings that has helped Oxford to produce, and foster, eternally, her peculiar race of artist-scholars, scholar-artists . . . The buildings and their traditions keep astir in his mind whatsoever is gracious; the climate enfolding and enfeebling him, lulling him, keeps him careless of the sharp, harsh exigent realities of the outer world. These realities may be seen by him. . . . But they cannot fire him. Oxford is too damp for that.

“Adorable Dreamer,” said Matthew Arnold, in his valedictory to Oxford: “Adorable Dreamer, whose heart has been so romantic! who has given thyself so

prodigally, given thyself to sides and to heroes not mine, only never to the Philistine! . . . what teacher could ever so save us from that bondage to which we are all prone . . . the bondage of what binds us all, the narrow, the mundane, the merely practical.”

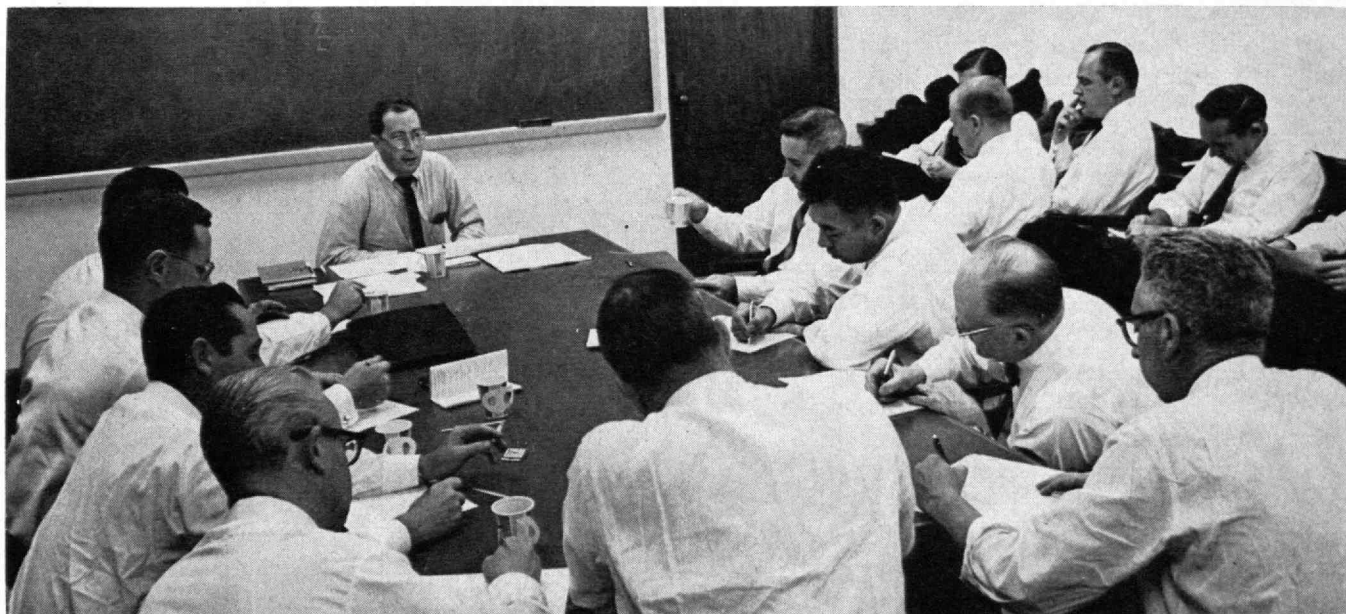
It is probably true that in the United States we have had a more pragmatic attitude toward knowledge than anyone else. Even in Russia, where one would least expect it, there is little interest in the “merely useful” and Harrison Salisbury in his recent travels there saw only one great agricultural experimental station on the American model. In that case, professors were working in the fields. They told Salisbury: “People call us Americans.”

There may not be many American professors working in the fields, but they can be found, when not waiting in airports, almost everywhere else: In factories, in government, in less advanced countries—and more recently, in backward areas of our own country, in mental hospitals, in the State Department, in educational systems, and in practically all the institutional crevices Ph.D. candidates can worm their way into. This is not to say that the deep ambivalence which some Americans hold toward the intellectual has disappeared, but it does indicate that academic man has become more committed to action, in greater numbers, with more diligence, and with higher aspirations than at any other time in history.

As to managerial philosophy, over the past decade we have seen a fundamental change in the basic attitudes which underlie managerial behavior, reflected most of all in the following three areas:

- ▶ A new concept of *man*, based on increased knowledge of his complex and shifting needs, which replaces the oversimplified, innocent push-button idea of man.
- ▶ A new concept of *power*, based on collaboration and reason, which replaces a model of power based on coercion and fear.

B. F. Herzog



- A new concept of *organizational values*, based on humanistic-democratic ideals, that replaces the depersonalized mechanistic value system of bureaucracy.

These changes may be light-years away from actual adoption but they have gained wide intellectual acceptance in enlightened management quarters and they have been used as a basis of policy formulation by many large-scale organizations.

All the foregoing changes affect organizations but the real *coup de grâce* to bureaucracy has come as much from our turbulent environment as from incorrect assumptions about human behavior. The pyramidal structure of bureaucracy, where power was concentrated at the top, seemed perfect to "run a railroad." And undoubtedly, for tasks like building railroads, for the routinized tasks of the Nineteenth and early Twentieth Centuries, bureaucracy was and is an eminently suitable social arrangement.

Nowadays, due primarily to the growth of science, technology, and research and development activities, the organizational environment of the firm is rapidly changing. Rather than a placid and predictable environment, today it is turbulent and there is a deepening interdependence among the economic and other facets of society. This means that economic organizations are increasingly enmeshed in legislation and public policy. Put more simply, it means that the government will be in about everything, more of the time. It might also mean (and this is radical) that maximizing co-operation rather than competition between firms—particularly if their fates are correlated—may become a strong possibility.

Also, we face the problem of revitalization: Alfred North Whitehead sets the problem neatly before us:

The art of free society consists first in the maintenance of the symbolic code, and secondly, in the fearlessness of revision . . . Those societies which cannot combine reverence to their symbols with freedom of revision must ultimately decay.

Organizations, as well as societies, must be concerned with those social conditions that engender a buoyancy, resilience, and a fearlessness of revision.

What can we expect in organizations of the future? A forecast falls somewhere between a prediction and a prophecy. It lacks the divine guidance of the latter and the empirical foundation of the former. On thin empirical ice, I want to set forth some of the conditions that will dictate organization life in the next 25-50 years.

The Environment: Rapid technological change and diversification will lead to interpenetration of the government—its legal and economic policies—with business. Partnerships between business and government will be typical. And because of the immensity and expense of the projects, there will be fewer identical units competing for the same buyers and sellers. The three main features of the environment will be

interdependence rather than competition, turbulence rather than steadiness, and large-scale rather than small-scale enterprises.

Population Characteristics: The most distinctive characteristic of our society is, and will become even more so, its education. Peter Drucker calls us the "educated society," and for good reason: Within 15 years, two-thirds of our population living in metropolitan areas will have attended college. Adult education is growing even faster. It is now almost routine for the experienced physician, engineer, and executive to go back to school for advanced training every two or three years. Some 50 universities, in addition to a dozen large corporations, offer advanced management courses to successful men in the middle and upper ranks of business. Before World War II, only two such programs existed, both new, and struggling to get students.

All of this education is not just "nice," but necessary. For as Secretary of Labor Wirtz recently pointed out, computers can do the work of most high school graduates—cheaper and more effectively. Fifty years ago education used to be regarded as "nonwork" and intellectuals on the payroll (and many staff workers) were considered "overhead." Today, the survival of the firm depends more than ever before on the proper exploitation of brain power.

Work Values: The lowered expense and ease of transportation, coupled with the real needs of a dynamic environment, will change drastically the idea of "owning" a job—or of "having roots," for that matter. Participants will be shifted from job to job and even from employer to employer with little concern for roots and homestead. People will be more intellectually committed to their jobs and will probably require more involvement, participation, and autonomy in their work.

Also, they will tend to be more "other-directed," taking cues for their norms and values from their immediate environment more than from tradition. We will tend to rely more heavily on temporary social arrangements, on our immediate and constantly changing colleagues. We will tend to be more concerned and involved with relationships rather than with relatives.

Tasks and Goals: The tasks of the firm will be more technical, complicated, and unprogrammed. They will rely more on the intellect than on muscle. And they will be too complicated for one person to comprehend, to say nothing of, control. Essentially, they will call for the collaboration of specialists in a project or team-form of organization.

There will be a complication of goals. Business will increasingly concern itself with its adaptive or innovative-creative capacity. In addition, meta-goals will have to be articulated and developed—that is, supra-goals which shape and provide the foundation for the goal structure. One meta-goal might be a system for



B. F. Herzog
 The men who make history meet the men who make knowledge:
 An industrial executive registers for a university seminar.

detecting new and changing goals; another could be a system for deciding priorities among goals.

Finally, there will be more conflict and contradiction among diverse standards of organizational effectiveness, just as in hospitals and universities today there is conflict between teaching and research. The reason for this is the increased number of professionals involved, who tend to identify more with the goals of their profession than with those of their immediate employer. University professors can be used as a case in point. More and more of their income comes from outside sources, such as foundations and consultant work. They tend not to be good "company men" because they divide their loyalty between professional values and organizational goals.

Organization: The key word will be "temporary"; there will be adaptive, rapidly changing *temporary systems*. These will be "task forces," organized around problems to be solved, of groups of relative strangers who represent a diverse set of professional skills. The groups will be arranged on an organic rather than mechanical model. The "executive" thus becomes a co-ordinator or "linking pin" between various task forces. He must be a man who can speak the diverse languages of research, with skills to relay information and to mediate between groups. People will be differentiated not vertically according to rank and status, but flexibly and functionally according to skill and professional training. This is the organizational form that will gradually replace bureaucracy as we know it. As no catchy phrase comes to mind, I call it an organic-adaptive structure.

Motivation: Such an organization should increase motivation, and thereby effectiveness, because it enhances satisfactions intrinsic to the task. There is a harmony between the educated individual's need for meaningful, satisfactory, and creative tasks and a flexible organizational structure. However, there will also be reduced commitment to work groups, for these groups will be transient and changing. While skills in human interaction will become more important, due to the growing needs for collaboration in complex tasks, there will be a concomitant reduction in group cohesiveness. I would predict that in the organic-adaptive system people will have to learn to develop quick and intense relationships on the job, and learn to bear the loss of more enduring work relationships. Because of the added ambiguity of roles, more time will have to be spent on the continual rediscovery of the appropriate organizational mix.

In general, I do not agree with those who emphasize a New Utopianism, in which leisure, not work, becomes the emotional-creative sphere of life. Jobs should become more rather than less involving; man is a problem-solving animal and the tasks of the future guarantee a full agenda of problems. In addition, the adaptive process itself may become captivating to many.

(Concluded on page 64)

THE BUSINESS OF PEACE

If we trust to luck, nuclear war is a likely prospect; multinational companies must join to expunge its causes

By Thomas J. Watson, Jr. | Chairman of the Board, International Business Machines Corporation

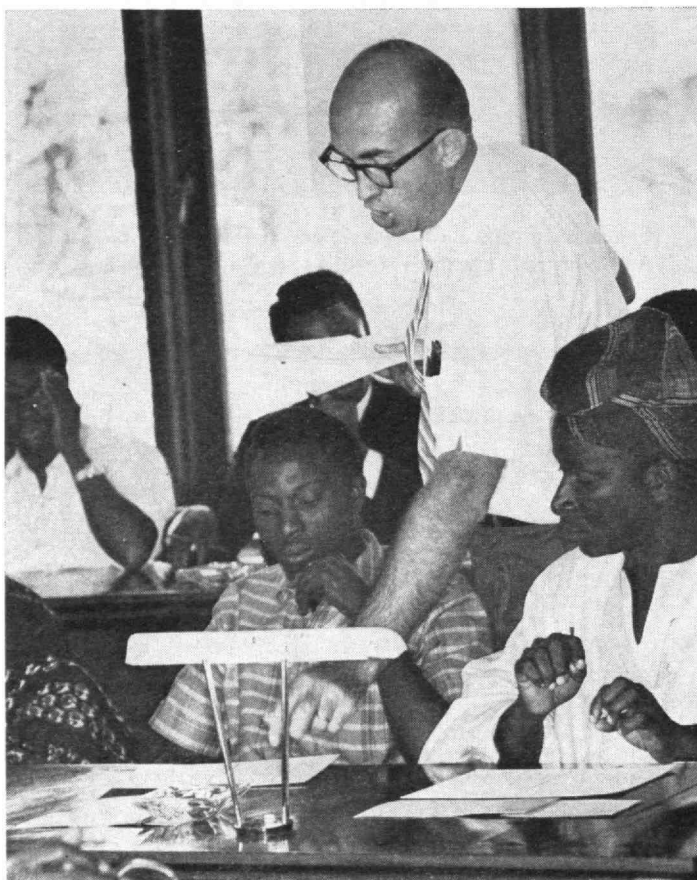
Today we live in a strange world—a world full of great promise, greater promise than any other era in history. At the same time, it is a frightening world. It is frightening because mankind now has the tools to destroy itself efficiently, rapidly, and completely.

Look for a few moments at the real possibilities of this world with all wishful thinking brushed aside and think, with me, the unthinkable. As Herman Kahn would say: "It is a little scenario . . . a possible real life . . . present day scenario."

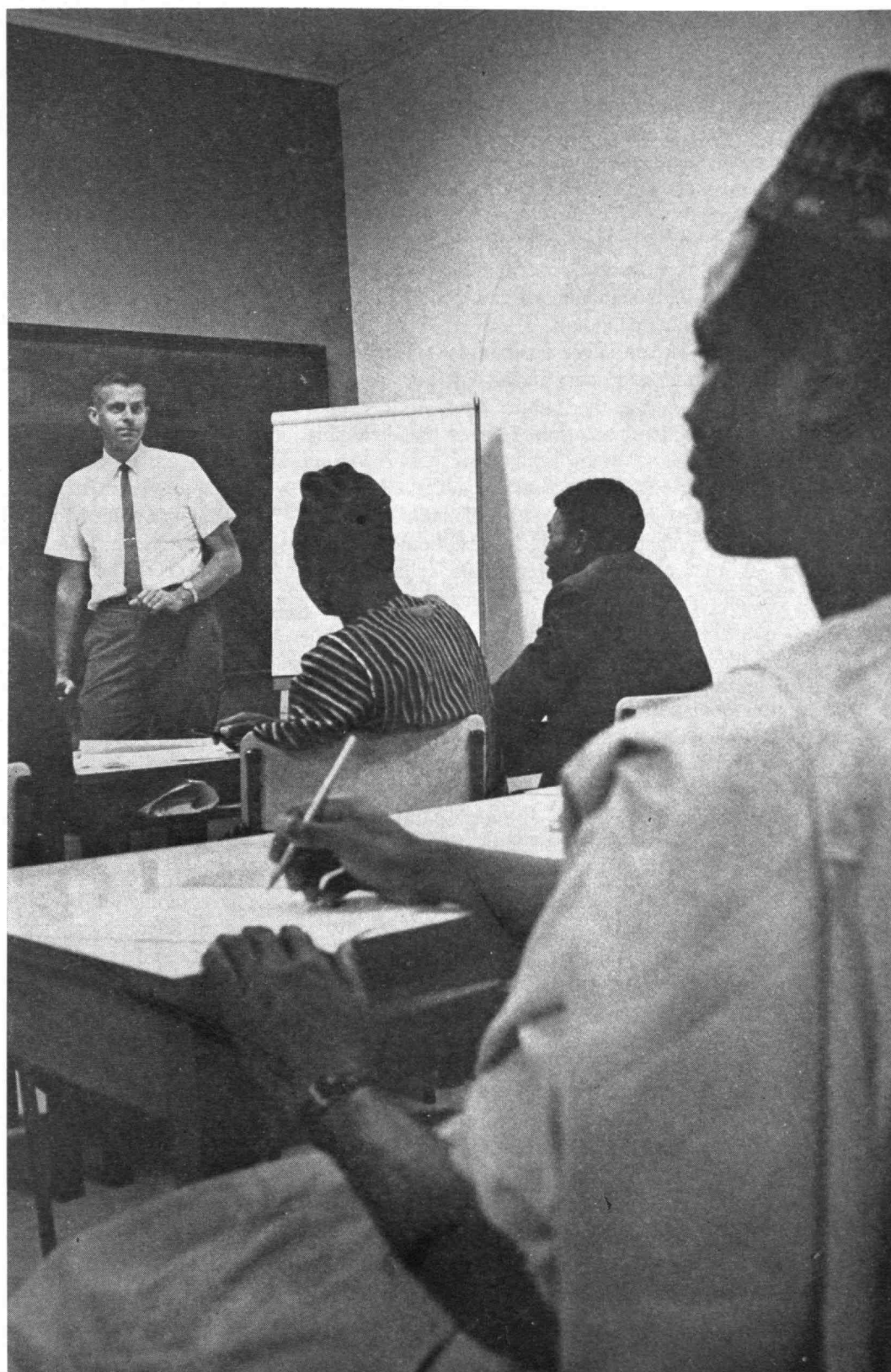
It begins with the report that a large-scale nuclear device has just exploded over New York City. The source of the bomb is unknown. Now imagine that we can take a radiation-proof plane from Boston and fly southwest to inspect the damage.

About 15 minutes out of Logan Airport, we begin to see the first signs of the blast, a pall of black smoke reaching five miles into the air. This cloud, moving northeast at 15 miles per hour, kills every living thing in its way. By the time it reaches the Atlantic—east of Nova Scotia—it will have doomed millions of people. As we get closer, about the time we are over Providence, we see yellow-orange flame, a great arc of it, stretching from New Jersey across southern Westchester County and over to Long Island. The arc is 30 miles in breadth.

Outside the fire belt, there is heavy damage but some vehicles are still moving. Their occupants will soon be dead. After we cross this flame wall, there is no motion, just thin smoke and a handful of twisted steel-reinforced buildings. In the center, a circle of five miles in diame-



Classes (above, right) in IBM Center in Ibadan, Nigeria, exemplify industry's opportunity in international affairs.



ter, there is total devastation. The skyscrapers are gone. In their place is a smoking, water-filled hole torn into the granite. Below are only the dead, 10 million or more, and millions more doomed by radiation poisoning.

That is enough of the scenario. We have all heard it before. We know it could happen approximately as described. But the big question is: When did we last think about it? If we leave the future to the gods of chance, this scenario will probably come true here in America or somewhere else in the world in the next decade. But if we focus on it and get the whole country to do likewise, we can begin to bring about changes which can give the world some hope for long-term survival.

One of these changes is modestly reduced sovereignty for the nations of the world. It might be a movement to government through world law, or a very strong U.N., or even a World Federation. All of these sound more reasonable in the light of reality. All of these schemes and many more are going to have to be considered seriously.

Closer to home, as businessmen, we can begin to bring about the "one world" concept. Through international business understanding we can develop international political understanding.

In this light, let me suggest a paradox; I believe it is the basic paradox of our times. Nuclear arms are proliferating. China has the bomb. Others are expected to get it. The bilateral balance of terror that held this world together for 16 years is breaking down.

At the same time, technology has advanced to the point where nearly all of the *real* problems of mankind are potentially solvable. Health, leisure, some reasonable degree of creature comfort, all are at last a real hope for any people anywhere on this earth.

First, consider nuclear proliferation. The schemes we now have to stop it, all of them, are based on novel and untried political arrangements, unnatural alliances or an international police arrangement with the power to exterminate any people on earth.

These approaches are based on a single, overwhelming assumption—ill will, hostility, distrust among men. If we accept this assumption, then the elaborate treaties and international armies may offer the only way to prevent proliferation and its almost inevitable consequences. But before we accept this as inevitable, I prefer to put my hopes on a more positive and more permanent solution.

I think we businessmen must join together to try to build a world so prosperous and thriving that the root causes of war disappear. We must create one world based on economic interdependence and rising living and cultural standards. Anything else, whatever name one chooses to give it, is not one-world and leaves unrelieved the economic and social tensions that cause men to build bombs.

I believe it is axiomatic that thriving nations freely exchanging capital, labor, and ideas are peaceful nations. The best evidence is Western Europe itself. It was the cockpit of nearly every major war in the past

300 years. Yet, the idea of war between the democracies of Western Europe just doesn't occur to anyone any longer. What would the issue be?

I therefore believe that a major goal of our country, and of ourselves as businessmen, is to help create successes, not just business successes but countries—whole nations—that are successful. I believe it is possible. The mechanism exists and I believe we businessmen are far more important to that mechanism than we sometimes suspect or care to admit.

It is in the less-developed world that we are challenged. It is in these 70 or so poor nations that trouble starts. *Time Magazine* counted 40 wars in them since 1946. It is in them that we will succeed or fail. The critical question is: How do we help them raise their living standards to an acceptable level fast enough?

I believe multinational corporations—international corporations—can do much of the job. They are the most efficient tool for generating wealth that the world has ever known. A Peru or Chile with a General Motors plant is a richer country than before it had one. Legend notwithstanding, there are few poor industrial workers in the world.

Multinational companies, along with the universities, are also the key instruments in diffusing scientific and technological advance through the world. Nothing is developed, anywhere in the free world, that is not quickly available everywhere. The diffusion of products and especially of ideas is broad-gauge and systematic.

It is easier, of course, to pinpoint the exchange of technology than the exchange of values. Yet, this exchange of values is also going on and is the seed of the one-world idea. International businessmen have learned from experience that ideas, plans, and machines work in one place just about as well as in another. People want just about the same things everywhere—dignity, recognition for their work, some security for their families, a feeling they are doing something that counts. This involves us in the basic value systems in a culture. IBM, and companies like it, have already been operating a kind of one-world system.

Now, if we conclude that multinational corporations can help in a major way to create wealth, spread technological progress and above all, create mutual understanding, then there is one more critical question: Can any combination of business, foreign aid, and technological advance really make an impact on the sea of poverty and ignorance we find in much of the world?

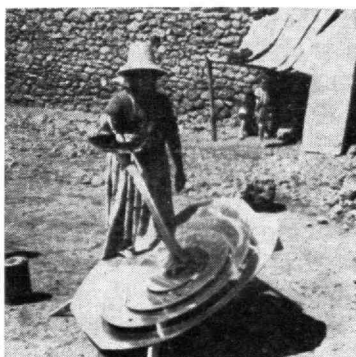
There are two billion people living in the less-developed world today, and that excludes Mainland China. Their average income is \$130 a year. Only a third are literate. Most of them are sick, or weakened by disease or malnutrition. Yet, despite this, there is a hopeful and positive side.

First of all, we no longer have to assume that explosive population increases are inevitable. Population planning, on a broad scale, is beginning to work in India, in Taiwan, and in South Korea.

(Concluded on page 64)

VITA NEW WAY TO A BETTER WORLD

By Benjamin P. Coe, '53



A Moroccan woman prepares a meal on a three-dollar solar cooker that VITA invented when commercial solar stoves proved unsuitable. This is just one example of VITA projects that Mr. Coe tells about in the accompanying article.

Benjamin Coe is executive director of VITA, a post he assumed last June after 10 years with the General Electric Company. He attended Bowdoin College and M.I.T. on the 3-2 plan and received an A.B. degree and a B.S. in chemical engineering. He wrote this article for the BOWDOIN ALUMNUS, and it is reprinted with the permission of the author and the editors. Copyright 1966 by the President and Trustees of Bowdoin College.

How many M.I.T. Alumni are participating in VITA? About 20 to 30, says Mr. Coe, but right now the organization is growing so fast that he's too busy to make a count.

Two-thirds of the world's population, the familiar litany goes, is ill-fed, ill-housed, illiterate, and generally ill. The facts are known but not comprehended: how many Americans, struggling to control the obesity produced by a 3,000-calorie diet and a desk job, can grasp how different their world is from that of the Guatemalan peasant who labors in the fields on less than 1,000 calories? And once they have understood the problem, what can they do? The problem is immense, stupefying. The average American, no matter how well-meaning, can hardly be blamed for concluding that he can only pay his taxes to support foreign aid and trust that someone will do something someday; meanwhile, the whole thing is beyond his puny reach. And he couldn't be more wrong.

Item: women in Morocco, who once spent their days collecting camel dung for cooking fires, now prepare meals on a solar reflecting stove made in their town from designs of a young physicist in Schenectady, N.Y.

Item: farmers in Bolivia, who once lost their carts and occasionally their lives on the torturous mountain trails of the Andes, now brake their vehicles with a mechanism designed by an engineer in Detroit.

Item: villagers in Guatemala, who used to lose up to 80 per cent of their chicks within a few days after hatching, have reversed the odds because of a simple, homemade brooder created by a professor in Kansas.

Item: literally thousands of Peace Corps Volunteers around the world refer constantly to a technical manual put together by a group of American scientists and engineers holding full-time jobs in stateside industry and education.

These people and many scores of others have found that they can indeed contribute to the cause of social and economic development in the 100-odd "emerging" nations of the world. They are participants in a unique venture called Volunteers for International Technical Assistance—or, more simply and appropriately, VITA.

The organization was founded in 1959 by Robert M. Walker, an atomic physicist at General Electric Company's great Research Laboratory in Schenectady, N.Y. He conceived the organization after listening to a visiting scientist outline a sweeping solution for the problems of the underdeveloped nations in terms of grandiose, as-yet-unimagined technological revolutions. Though Walker knew comparatively little about the problems of inter-

national development, he suspected that the then-popular "Buck Rogers" approach was probably just the opposite of what was needed. Far from requiring whole new technologies, the underdeveloped nations needed access to existing down-to-earth technological resources of the Atlantic civilization. What was needed, Walker guessed, was not a whole new set of solutions, but rather a systematic effort to apply the technological prowess of the advanced industrial nations to some of the problems of the developing nations. He suspected, in fact, that comparatively little of America's technical energy was being applied to the problems of development.

Investigation confirmed this hypothesis. Walker discovered, for example, that the payroll for scientists and engineers in the Capital District of New York (Albany-Troy-Schenectady) exceeded the *entire annual budget* of the United Nations for technical assistance. Walker and his fellow planners, working first within the Mohawk Association of Scientists and Engineers, concluded that even a partial application of the scientific and engineering talent in their immediate vicinity would have a measurable effect. Thus, in a combination of visionary idealism and down-to-earth practicality, VITA was born.

The new organization was received at first with understandable skepticism. Some doubters, accustomed to thinking of development in terms of massive dams, power projects, and heavy industries, wondered whether part-time consultants could make a useful contribution—and would they, even if they could? A canvass of organizations active in the assistance field quickly yielded the answer to the first question. Such groups as CARE and the Maryknoll Fathers responded enthusiastically to the first queries from VITA, for they had in their files many small but very real problems of the sort that could not be attacked effectively on the large-scale, government-to-government level of most technical assistance programs.

Indeed, VITA's first successful project stemmed from that initial inquiry—an adapter to permit the showing of educational filmstrips on a flashlight-powered slide projector, designed by GE metallurgist Robert

DeVries to meet the needs of a Maryknoll missionary in the Bolivian Andes; from CARE a more portentous request for information about solar cookers, stoves utilizing the reflected heat of the sun. Out of that request grew a contract to evaluate all existing solar cookers, a project undertaken by William B. Hillig, a physicist at the GE Research Laboratory.

The solar cooker project turned out to be the first major demonstration of VITA's potential. Dr. Hillig and his evaluation team drew up a set of criteria for a solar cooker which would be useful in primitive situations; it should be, they decided, cheap and easy to make, repair, and use—and, of course, it should actually cook food. The existing cookers mostly worked very well, but the majority of them employed parabolic, spun-metal reflectors which were difficult and costly to make, quite susceptible to damage in rough handling, and almost impossible to repair.

Challenged by his own criteria, Hillig set out to make a cooker which would meet them. After experimenting briefly with other models, including an inflatable type, he settled on a reflector employing the Fresnel mirror, devised by an Eighteenth Century physicist to boost the candlepower of primitive lighthouses. Since it used only simple curves, the reflector could be made from almost anything—Hillig used Masonite—with simple hand tools; covered with aluminized plastic film, it worked just fine, and it could be made with less than \$3 worth of materials at U.S. prices.

VITA's Fresnel cooker attracted considerable notice when it was displayed in Rome at a UN conference on unusual sources of energy. A series of demonstrations followed atop the UN Secretariat in New York, where UN staffers from many countries sampled food cooked with it. The cooker is now being field-tested in Africa and the Near East under UN auspices, and a small manufacturing operation has been established in Morocco with the aid of the UN and the Peace Corps. It is not yet known whether the cooker will turn out to be a complete answer for all those areas of the world where sunlight is more abundant than household fuel, but it has demonstrated VITA's ability to make a

very real contribution through the efforts of dedicated volunteers.

Time has also answered other major questions about VITA. In the beginning there was some doubt that technical people, who are widely reputed to be exclusively concerned with abstruse problems of their own devising, would respond to so altruistic an appeal. VITA's experience suggests that scientists and engineers have a far broader conception of their obligations than their critics might suppose. Initially composed mostly of local people, with heavy representation from GE, Union College, Rensselaer Polytechnic, and other nearby facilities, VITA now has more than 1,300 participating scientists, engineers, businessmen, and educators on its roster. They live in 48 states and 17 countries, and they work for 250 corporations and 65 universities. Where participants are concentrated in sufficient numbers, separate chapters have been formed to serve as centers for team effort on larger projects. Some chapters center on a particular industry and have a resulting specialty; the New Holland (Pa.) chapter, for example, is comprised almost entirely of men working for the New Holland Machine Company, an agricultural implement company, while the Rochester (N.Y.) chapter is centered at Eastman Kodak, the Peoria (Ill.) group at Caterpillar Tractor, and, of course, the Schenectady chapter at General Electric. Other chapters, such as Detroit, offer a broad spectrum of skills in many different fields.

VITA has also formed working relationships with such professional and technical societies as the Institute of Food Technologists and the American Institute of Chemical Engineers, thus gaining access to their entire membership as an additional resource for solving problems within their specialties.

This diversity illustrates one major strength of the VITA concept. Because it works through volunteers who contribute their time and talents, VITA has no inherent limit on the number of skills it can enlist. Indeed, we sometimes find ourselves using howitzers to swat flies, as when we provided a Peace Corps Volunteer in Morocco with plans for playground equipment designed by a professor of stress analysis at the University of Kentucky. On the oth-

er hand, the use of such expertise often eliminates the need to re-invent the wheel: when a Peace Corpsman in Guatemala posed a problem about ants attacking the local beehives, VITA drafted a Florida agronomist to supply directions for installing an ant baffle in the hives, a government entomologist in Louisiana to identify the ants in question, and a chemist from Union Carbide in Michigan to suggest an appropriate insecticide (down to and including the address of a store in Guatemala City where it could be purchased).

The rich lode of knowledge represented in VITA's extensively cross-indexed files is, of course, of great value to those who need help on specific questions, whether they be Peace Corps Volunteers or other Americans working overseas, indigenous institutions, or simply individuals with a problem. Americans, surrounded by the incomparable riches of the mightiest technology in history, find it difficult to conceive how hard it may be to find even the simplest kind of information: one of VITA's first questions dealt with how to figure the lifting capacity of a pump at high altitudes.

Partly because they have become aware of this enormous gap, VITA's participants have begun to work more actively to supply answers for questions which have, in some instances, not even been posed yet. VITA has produced two editions of a *Village Technology Handbook*, a compilation of useful information on a variety of common problems, and the United States Agency for International Development has distributed more than 10,000 copies to field workers.

Six years after it began, VITA's usefulness can no longer be doubted. Of the 1,600 requests for service received, some 48 per cent have come from Peace Corps Volunteers, and 32 per cent from individuals and institutions, both governmental and private, indigenous to the developing countries. The remainder have originated with UN personnel and a variety of American agencies, including personnel of AID.

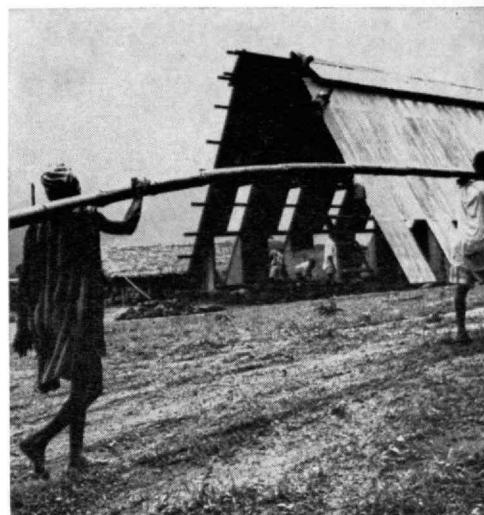
All this is not to suggest that everything always runs smoothly. Sometimes communications break

down: the problem is not adequately defined, or the solution fails to take account of all the conditions. Some of VITA's replies—a minority of them—have been almost ludicrously inappropriate to the circumstances overseas. More often though, one can only wryly recall the old medical joke: the operation was a roaring success, but the patient died. In development as in other forms of cultural transfer, the validity of a project does not always determine its fate.

Take the case of the Peace Corps Volunteer in Costa Rica who enlisted VITA's aid on a co-operative chicken-and-egg venture. Local benefits had raised the money to buy the chickens, the church provided building materials, and VITA supplied plans for a coop—"better-constructed," the Peace Corpsman wrote, "than most homes here." The eggs were used to supplement the low-protein diet of local school children, with a modest surplus sold to buy chicken feed. "In December," continued the Volunteer, "both of us [Peace Corps Volunteers] were asked to work . . . in the Capital city, and while we were away the Committee sold all of the chickens and every piece of wood from the chicken coop; only the cement floor remained when we got back. The reason offered was that the chickens weren't laying eggs and they were afraid they were going to lose money."

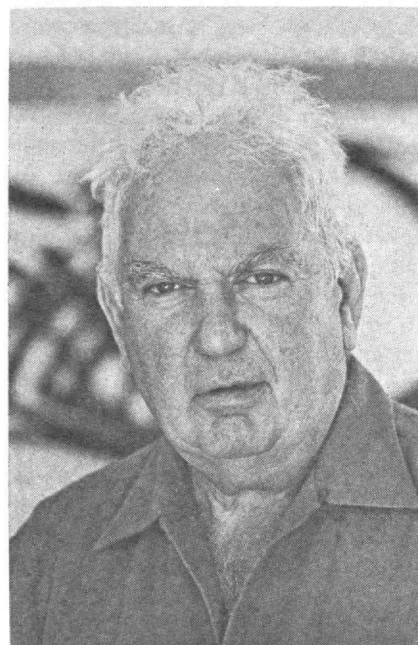
Despite such occasional reverses, the over-all success of VITA has been recognized. The Peace Corps regards the organization as a major source of support for the volunteer in the field. Major U.S. corporations and foundations, not noted for their habit of encouraging pie-in-the-sky operations, have contributed generously to the financing of VITA's efforts. The organization has also attracted the support of eminent individuals, among them Harvey Brooks, dean of Harvard's Division of Engineering and Applied Physics; Frederick Seitz, President of the National Academy of Sciences; Walker L. Cislser, President of the Engineers Joint Council and Chairman of the Board of Detroit Edison, and Augustus B. Kinzel, '21, President of the Salk Institute and National Academy of Engineering.

(Concluded on page 53)



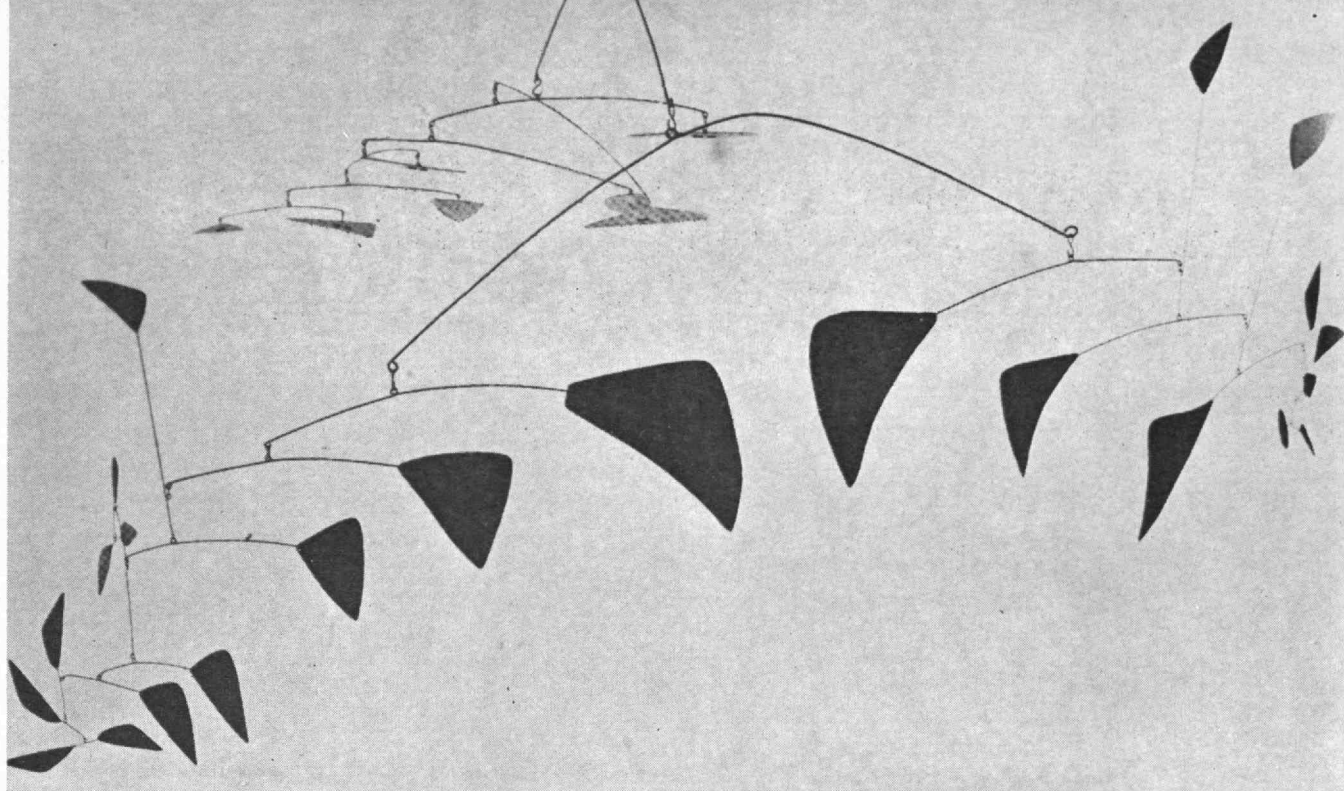
Top: An A-frame structure designed by VITA to meet the need of Sierra Leone for school buildings that would be inexpensive, easy to erect, and resistant to wind, termites, and heat. Middle: The Peace Corps sought to replace such log bridges on rural roads in Sierra Leone and VITA provided a design. Bottom: Sargent Shriver attends dedication of a Peace Corps-VITA bridge.

Calder In Review



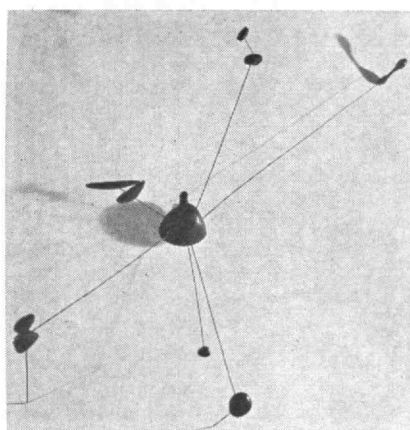
ALEXANDER CALDER

KNOBS AND CURLICUES (1963). Iron Plate, 74 $\frac{5}{8}$ inches high.



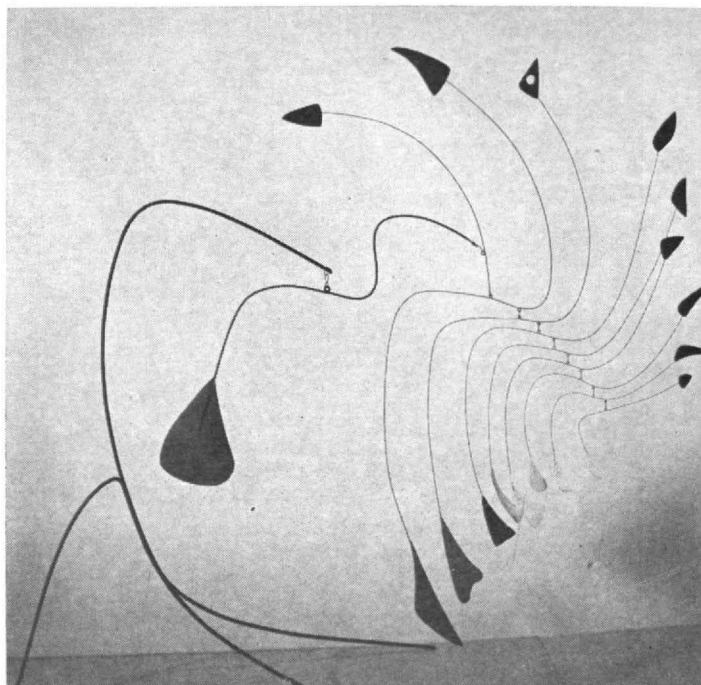
SUMAC (1961). Metal, 49¾ by 94 inches.

Alexander Calder came to M.I.T. this spring to put up one of his great stabiles of steel plates. (See 'The Big Sail,' next page.) Here, The Review presents a sampling of his other works, as background for viewing the new sculpture. Calder the artist evolved from Calder the engineer; he studied mechanical engineering at Stevens Institute of Technology, where he was a classmate of Eugene McDermott, the sponsor of McDermott Court. In Calder's memoirs, to be published next fall by Pantheon Press, he recalls his college days and his association with the artists and writers of his time. The following excerpt, reprinted with the permission of the publisher, gives a glimpse into his varied and colorful career.



CONSTELLATION (1943). Metal and wood, 30 by 24 inches.

LITTLE SPIDER (c. 1940). Metal, 55 by 50 inches.

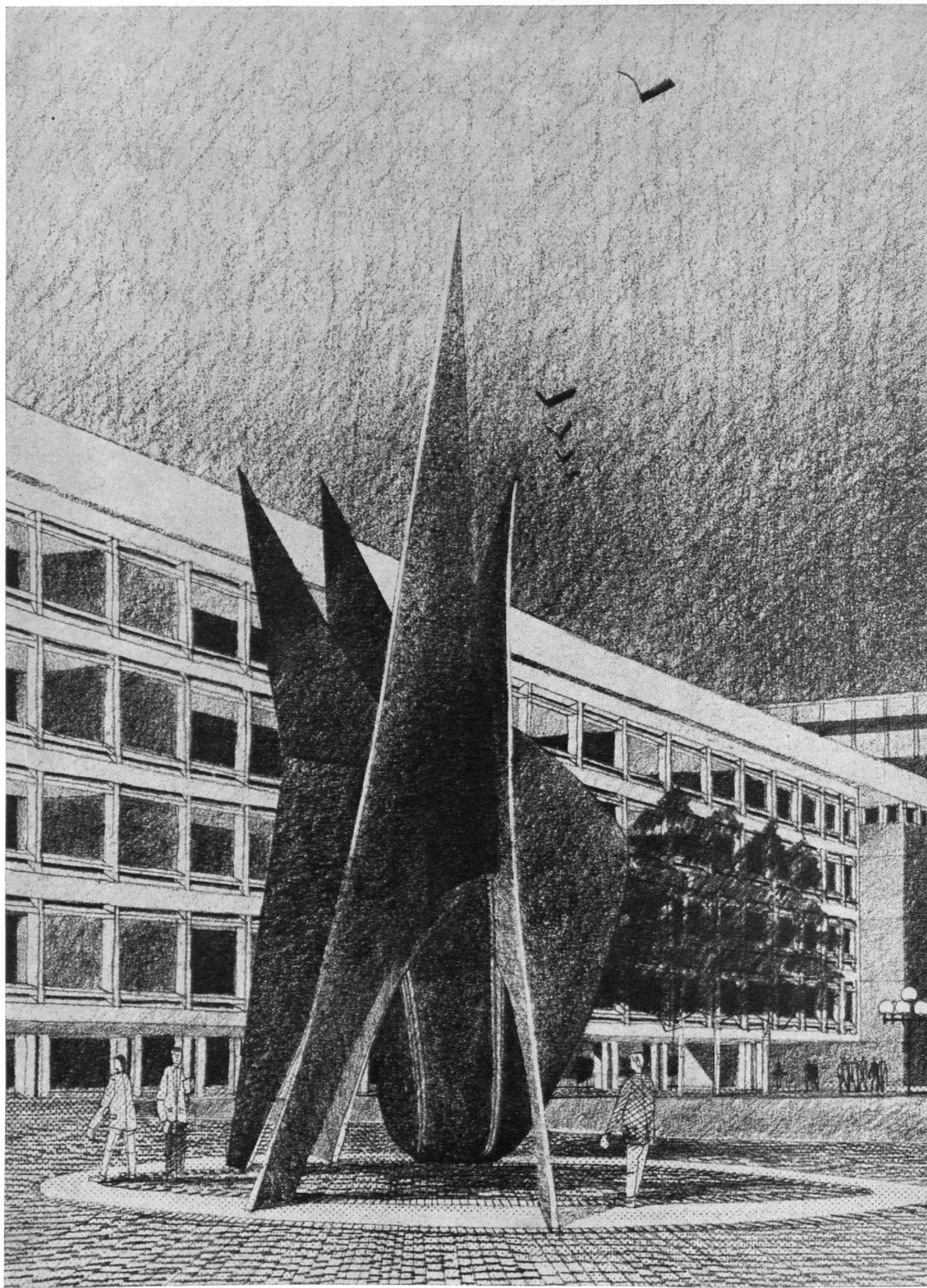


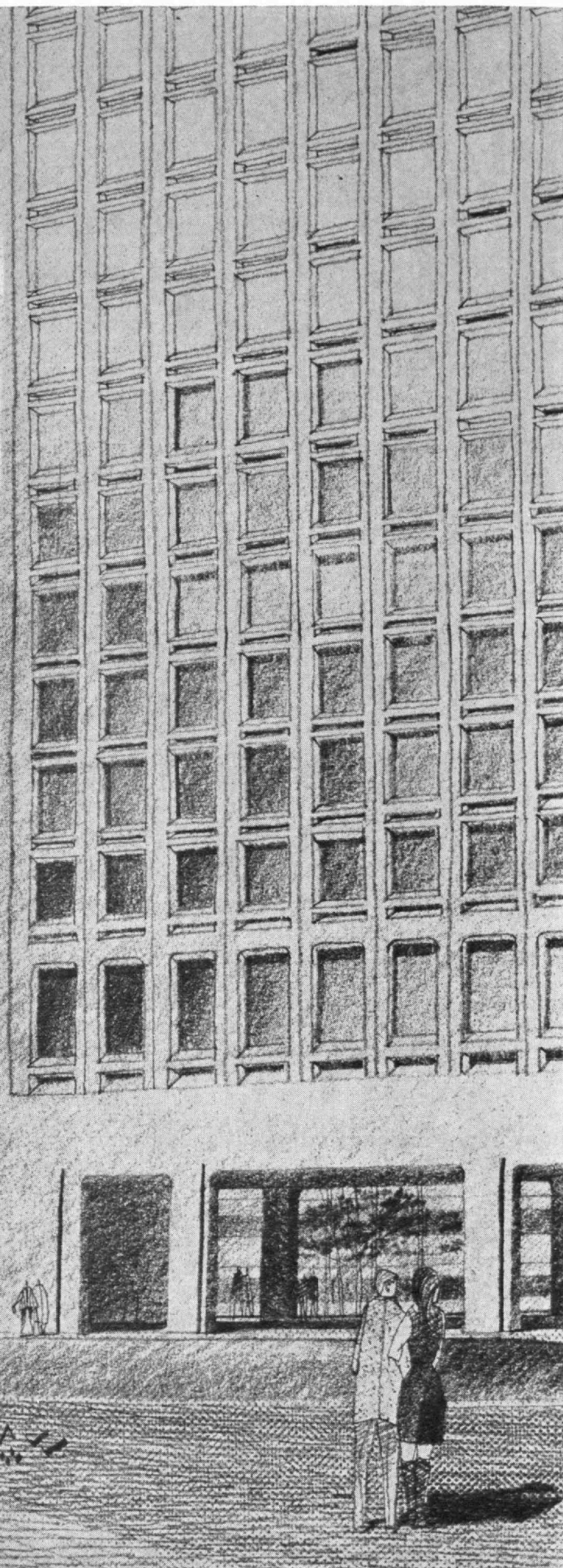
I'd heard of Hemingway from Miro and others and Miro had always told me to present myself to him, as one of his friends, if I ever met him. On the "Flandre," it so happened that we were right outside the "bridal suite," which was occupied by Hemingway and his wife.

He appeared suddenly and I presented myself, but it was not much use. For, I had nothing to say to him and he had nothing to say to me. And that went for Louisa too.

At the end of the voyage, toward Le Havre, we were seated on the deck, discussing with some friends how much to tip all and sundry and we decided Hemingway deserved five dollars for having revived local color, but no more.

Photographs: Perls Galleries, New York



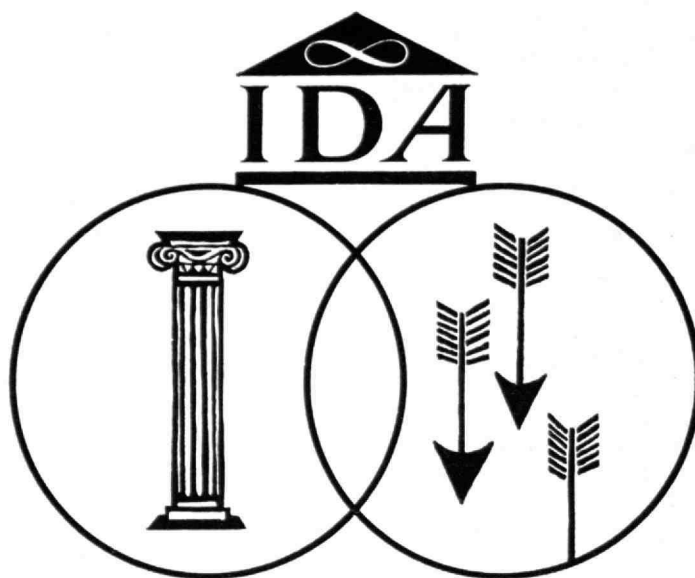


‘THE BIG SAIL’

“Why not call them ‘stabiles’?” Jean Arp suggested to Alexander Calder when he first saw the new metal and wood sculptures. Calder showed his “stabiles” for the first time at the Galerie Percier in Paris in 1931. As time passed, they evolved in scale and style from the early, small geometric constructions to larger forms composed of flat sheets of metal, usually painted black, but sometimes, influenced by Mondrian’s work, with a primary color added. Of late, they have become spectacularly large. One huge piece in the middle of a street in Spoleto is large enough for trucks and buses to pass under it. In 1964, Calder was honored by an exhibition devoted exclusively to his giant stabiles at the Galerie Maeght in Paris.

In the late spring of this year, Calder’s “The Big Sail” will dominate the new McDermott Court on M.I.T.’s East Campus. Set in a grassy tree-lined mall extending from Memorial Drive, its soaring 40 feet of steel plates will rise dramatically against the background of the 20-story Cecil and Ida Green Building. “McDermott Court is tangible recognition of the need for quiet areas that are attractive and restful to the eye. It is our hope that it will serve as a model for the development of other such areas at the Institute,” says President Julius A. Stratton, ’23.

Left: “The Big Sail” is the focal point of McDermott Court, which was designed by I.M. Pei [’40] and Associates, architects for the Green Building and of a future chemistry building (left). The court is made possible by the generosity of Mr. and Mrs. Eugene McDermott, of Dallas, Texas.



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The VITA Story

(Concluded from page 47)

But what of the VITA participant, the man (or woman) who's in there digging, evenings and weekends? What does he gain?

Obviously, he acquires a rather exotic avocation, one which is, at the very least, good for cocktail-party conversation—but also one which may turn out to be as deeply challenging as the job by which he earns his living. Because VITA emphasizes the value of direct communication between the man who has the problem and the participant who is trying to solve it, the VITA member may also have the interesting experience of working with someone who, in a very literal sense, lives in another world.

But beyond all these is the most obvious and most important satisfaction of all, the opportunity to do something in a very real and tangible way to better the lot of another individual or group of individuals, which is another way of saying that one has a chance to make it a better world. Carl F. Stover of the National Institute of Public Affairs has said, "If we are going to do a real expert job of providing development for the underdeveloped countries of this globe, we have to get some of these . . . scientific and engineering resources, human resources, tied to that task." VITA is a means of doing just that.

In the process, VITA participants are gradually learning more about the needs, resources, and limitations of the countries they are trying to help; education of key citizens of this highly developed nation is by no means the least important by-product of VITA. Senator Eugene J. McCarthy (D-Minn.) commented at the International Convocation on the Requirements of Peace: "It is my judgment that if we are to respond . . . there must be first, a measure of understanding of our people; but more than that, a commitment of will, a moral commitment." It is, of course, just such a commitment that lies at the heart of the VITA concept, and I think it not too much to say that in the end it may well be VITA's most important result.



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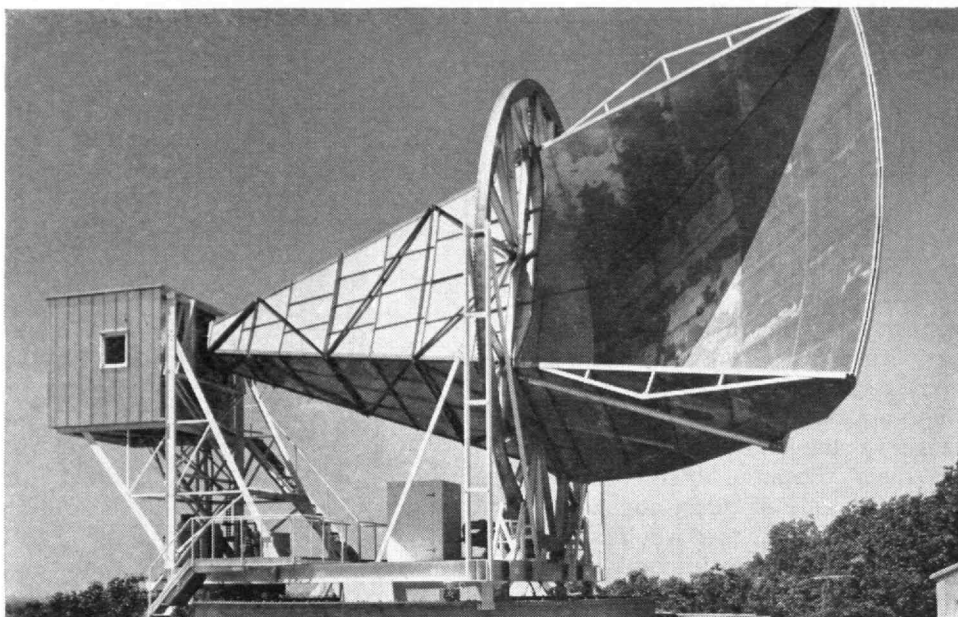
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Report from

BELL LABORATORIES

Bell Laboratories' horn-reflector antenna located at Holmdel, New Jersey. It is coupled to a traveling-wave maser receiver through a waveguide switch which permits comparison of received noises and noise from a reference source.



A radio problem that may have a ten-billion-year-old solution

Activities in technology sometimes have surprising implications. For example, recent antenna tests conducted by Bell Telephone Laboratories at Holmdel, New Jersey, have apparently produced evidence about the early history of the universe.

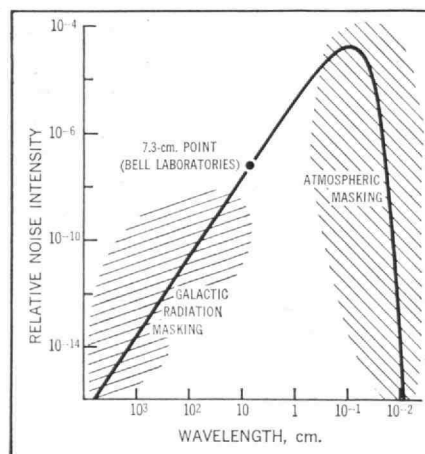
In their radio communications studies, Bell Laboratories scientists had been using a horn-reflector antenna (employed on Project Echo and Telstar® experiments) to measure the radio noise emitted by Cassiopeia A, an exploded star now surrounded by fiery gas. This and other similar measurements require accurate knowledge about or elimination of noise produced by the atmosphere, the ground, and the components of the antenna system itself. Now, noise from the Earth's atmosphere can be accurately measured and the antenna is so directional that ground noise is negligible (verified through a series of tests with a mobile transmitter). The electrical joints in the antenna system and waveguide were reworked and sealed to eliminate any possible noise due to leakage. And, an extremely accurate noise-level reference source—the best produced so far—was designed and built especially for this project.

But there was some noise which could not be explained. It was stronger than that radiated by the distant fixed stars. It showed none of the patterns typical of man-made interference. Drs. A. A. Penzias and R. W. Wilson were frankly puzzled. Strangely enough, similar unex-

plained noise, of the same order of magnitude, had been suspected by Bell scientists during the Project Echo and Telstar experiments. At that time, though, measurement techniques were not sufficiently perfected to allow them to be certain of their suspicions.

Not far away, however, at Princeton University, an explanation was being devised without knowledge of the Bell experiments. A group under Prof. R. H. Dicke was seeking information about the relationship between gravity and the recession of distant galaxies from us and from each other. The original composition of our galaxy (inferred from spectral lines of "old" stars) and the belief—held by many astronomers—that all matter was once compressed into a vastly smaller volume than at present suggested to the group that the universe was at that time much hotter—a veritable fireball. Such a fireball would emit a characteristic "black-body" radiation which—after cooling through billions of years of expansion—would have fallen in frequency from about 10^{20} cps. to about 10^{10} cps. It would thus lie in the radio spectrum, at wavelengths of a few centimeters. This was very much like the noise which was puzzling the men at Bell Laboratories.

A mutual acquaintance saw a possible connection and put Bell in touch with Princeton. Result: the signal received at Bell Laboratories has enabled Prof. P. J. Peebles of Princeton to draw the hypothetical radiation spectrum shown in the figure. Future



Virtually all of the "black-body" radiation which might have come from the supposed primordial fireball is concentrated between wavelengths of 7500 cm. and 0.01 cm. However, the long-wave end of the spectrum is masked by the galactic radiation to which radio astronomers listen and the short-wave end is masked by the Earth's warm-air atmosphere. Therefore, only the portion of the curve between about 20 cm. and 1 cm. can be studied. Bell Laboratories has supplied a point at the Telstar wavelength (7.3 cm.). Bell and Princeton scientists will next look for other points along the same curve. If these points are found, they will be powerful evidence of such radiation and, in turn, of the former existence of the fireball itself.

measurements at other wavelengths within this spectrum are planned at both Bell and Princeton to determine whether there was a primordial fireball. If so, it will be the first reliable view man has had of events 10 billion years ago.



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M.I.T. Battles the Inner Belt

Francis W. Sargent, '39, Commissioner of the Massachusetts Department of Public Works, has announced his Department's decision on the route of the proposed Inner Belt highway through Cambridge: Of the four routes proposed, the Department favored the one that would run along the west side of Brookline and Elm Streets, cutting across Massachusetts Avenue between Lafayette Square and Central Square. If this decision is approved by the U.S. Bureau of Public Roads, M.I.T. would be spared the loss or disruption of 17 laboratories and buildings in the path of the route recommended earlier.

The state's decision on March 15 ran counter to the wishes of the Cambridge City Council, which had been embroiled for some time in a controversy involving M.I.T. and many Cambridge residents and business firms. At issue was the question whether the eight-lane urban expressway would slice through part of M.I.T.'s campus or through other residential and industrial sections of the city. At an 11th-hour meeting on February 28, the Council decided it could not approve any route and, adopting a resolution to fight any attempt to construct the road, the Councilors flew to Washington in early March to carry their objections directly to the Federal bureau of roads.

It all began when the consulting engineering firm of Barton-Aschman Associates of Chicago recommended to the Cambridge City Council the so-called "railroad route" for the proposed eight-lane highway. Barton-Aschman, which was retained by the City Council for this study, had evaluated three other proposed routes through Cambridge and had concluded that the railroad route was the best choice. The report said: "The effects of the alternate alignments on the present and projected needs of M.I.T. were not part of this study. However, these effects must be weighed prior to a commitment being made on the line to be constructed."

The recommended route would follow the roadbed of the Grand Junction Railroad through the northern quadrant of the M.I.T. campus. Affected directly or indirectly by the construction of a superhighway on this route would be some 17 M.I.T. laboratories and buildings. In addition, it is estimated that the route would take 552 homes and eliminate 2,400 jobs, 1,017 of them at M.I.T.

In a statement to the press, James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, said:

"After careful study, the Massachusetts Institute of Technology has concluded that it has no choice but to oppose with all the vigor at its command the Inner Belt highway route recommended by Barton-Aschman Associates to the Cambridge City Council or similar routes which have been proposed involving the railroad tracks or M.I.T. property in areas north of the railroad.

"Such routes would have catastrophic effects on M.I.T., since many of its vitally important facilities would be destroyed and the whole fabric of the institution would be damaged. Under these circumstances, the Institute has an obligation to speak; it would be irresponsible to remain silent."

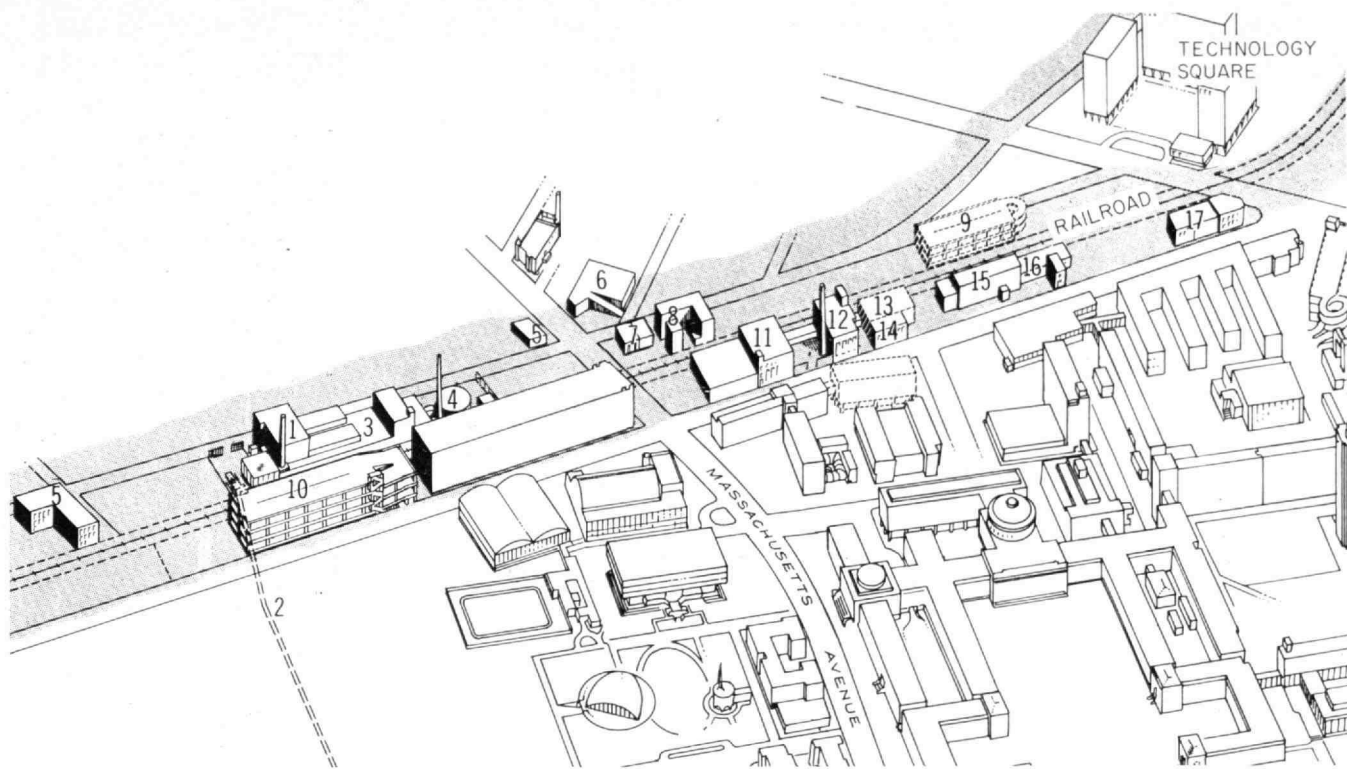
Dr. Killian detailed the effects the proposed Inner Belt route would have on M.I.T. They would include the loss, disruption, or relocation of:

- ▶ The Instrumentation Laboratory, which is engaged in national defense and space research programs such as the Poseidon, Sabre, and Apollo projects.
- ▶ The High Voltage Research Laboratory where cancer patients receive 10,000 treatments a year.
- ▶ The Hydrodynamics Laboratory, devoted to hydrodynamics and water resources planning and development.
- ▶ The Cyclotron Building, housing a 30 million-electron-volt particle reactor.
- ▶ The Nuclear Reactor, where 100 scientists, engineers, and technicians are studying the structure of matter and working on nuclear technology.
- ▶ The Department of Chemistry's Nuclear Chemistry Laboratory, which depends on the reactor.
- ▶ The National Magnet Laboratory, which produces the strongest, continuous magnetic fields ever achieved.
- ▶ The Cryogenic Engineering Laboratory, serving M.I.T. and other users as a source of liquid helium and liquid nitrogen.
- ▶ The Rockefeller Accelerator Building, which houses a 3,000,000-volt Van de Graaff generator used by students and Faculty from the Department of Nuclear Engineering in studies of nuclear properties.
- ▶ The Institute's Chilled Water Plant, which is presently under construction.
- ▶ The Department of Chemical Engineering's High Pressure Laboratory.
- ▶ The Department of Aeronautics and Astronautics' 100-foot shock tube.
- ▶ Two multi-story parking garages.

As to cost to the Institute, Dr. Killian said:

"It is impossible at this time to make a complete or accurate estimate of damages to M.I.T. They would appear to be at least \$80,000,000. The replacement cost of the land and buildings lost by M.I.T. through adoption of the railroad route is at least \$35,000,000. Possible damages resulting from other phases of the public improvement such as access roads may reach as far as \$10,000,000. Severance damages, consequent upon the effect of takings on the entire M.I.T. property, are estimated at a minimum of \$35,000,000."

Dr. Killian added: "The Corporation of the Institute



The shaded area on this map of M.I.T. indicates buildings and facilities that would be affected by an Inner Belt route along tracks of the Grand Junction Railroad. They are: 1—The National Magnet Laboratory, and 2—The laboratory's cooling water line; 3—Nuclear Chemistry Laboratory; 4—Nuclear Reactor; 5 and 6—Instrumentation Laboratory; 7—High Voltage Research Laboratory; 8—Instrumentation Laboratory; 9—Parking garage, under construction; 10—Parking garage; 11—Cryogenic Laboratory; 12—Power Plant; 13—Chilled Water Plant, under construction; 14—High Pressure Laboratory; 15—Cyclotron; 16—Rockefeller Accelerator; 17—Hydrodynamics Laboratory.

will do all that it properly can to make clear the impact of the destruction that is proposed. It will do all that it appropriately can to resist the selection of an Inner Belt route that will impose such far-reaching damages, that will impose unacceptable financial penalties on the Institute, and that will disastrously retard the programs and injure the whole fabric of the Institution as a world center of education and research."

In a letter to the M.I.T. community, President Julius A. Stratton, '23, also spoke out. "Surely, it is the responsibility and the civic obligation of Massachusetts Institute of Technology to protest against a threat so destructive to its own and the community's welfare as well as the national defense effort and to urge that some other route for the Inner Belt highway be developed, the consequences of whose land-taking will be far less disastrous," he said.

"I want to assure you that M.I.T. is doing all that it properly can to make clear the impact of the crippling destruction that is proposed; we will do all that we can to resist the selection of an Inner Belt route that will impose such far-reaching damages and such unacceptable financial penalties to the Institute," Dr. Stratton said.

M.I.T. took its case to the City, and on February 22 Edward B. Hanify, counsel for M.I.T., spoke to the Cambridge City Council at a hearing on the pro-

posed route. "M.I.T. is not here . . . unmindful of these consequences or seeking to have others bear them," he assured the Council, and added: "The Institute is deeply concerned with the problem of relocating homes involved in any route location including the so-called recommended route. It stands ready with others in sponsoring nonprofit, low-cost housing and in sharing in its financing if necessary. This it regards as a much more constructive step for Cambridge than the further loss of taxable property consequent upon M.I.T.'s enforced acquisition of twenty-eight acres of additional land to replace the land taken from it.

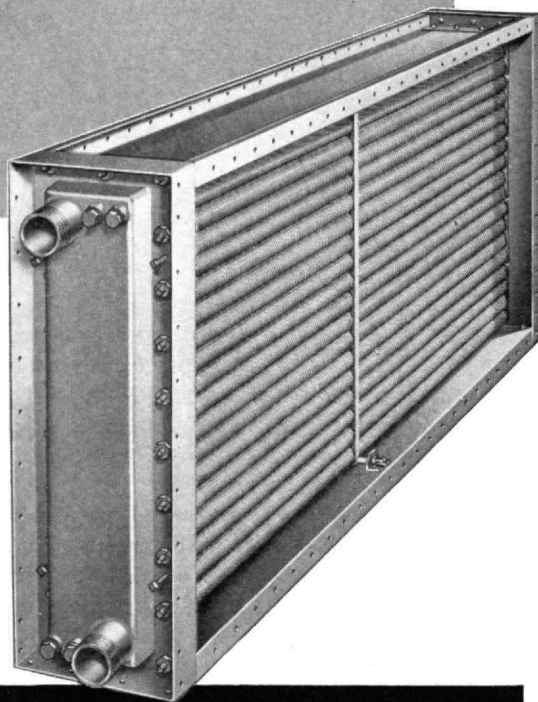
"We do not put scientific laboratories in one scale and human beings in another, dollars in one scale and people in another, research in one scale, homes in another," Mr. Hanify said. "We ask only that you see in our teaching and research facilities and defense-dedicated laboratories their meaning to humanity—their meaning to homes and people in Cambridge and the nation—their essential role in protecting our homes and our people from the awful consequences of the scientific superiority of implacable foes."

Student reaction to the Inner Belt route was voiced in the February 21 issue of *The Tech*: "There doesn't seem much the average student can do but root for the Institute and pray that the Cambridge City Council and the Massachusetts Department of Public Works realize the consequences of destroying a good portion of what we think is the nation's most important university. So pray."

Press coverage of the controversy was heavy, with every Boston newspaper devoting extensive space to the problem on both news and editorial pages. Not the least of the attempts of the news media to keep the public informed in the controversy was a half-hour television documentary, "M.I.T. and the Inner Belt—Crisis on the Charles," by WHDH-TV in Boston.

(Continued on page 58)

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ENGINEERING OFFICES IN PRINCIPAL CITIES

THE TREND OF AFFAIRS

(Continued from page 57)

Cause of Explosion Determined

The Atomic Energy Commission has announced that the explosion and fire at the Cambridge Electron Accelerator on July 5, 1965, was the result of sequential failure of the inner and outer beam windows of the facility's hydrogen bubble chamber.

"The accident started in the bubble chamber area when fragments of the inner beryllium window hit the outer beryllium window, breaking it and allowing hydrogen to escape and ignite," the agency reported.

"It was the design intent that the liquid hydrogen in the bubble chamber be safeguarded by a double containment system. The vacuum jacket for the bubble chamber was designed to provide both an insulating vacuum around the bubble chamber and a safety container for liquid hydrogen in the event of its release from the chamber itself. A special dump system for the vacuum jacket to vent the hydrogen outside the building was provided. The fact that the failure of the inner beryllium window caused the failure of the outer beryllium window prevented the venting system from operating as intended," the AEC explained.

The report said that a contributing factor to fire damage was the release of liquefied propane stored nearby for experimental purposes. However, with adequate safeguards based on current technology, there is no reason why the hydrogen bubble chamber cannot be safely operated at the Cambridge Electron Accelerator or at any other site, the AEC concluded. The accelerator is an \$11,600,000 facility built by the AEC and operated jointly by Harvard and M.I.T.

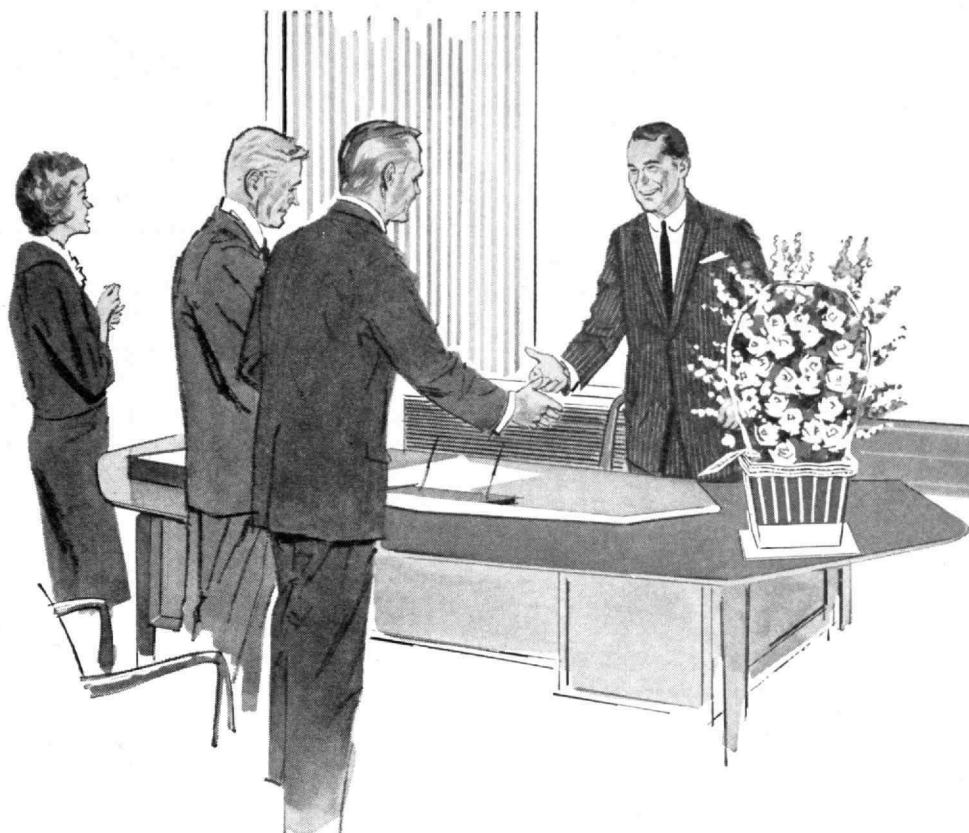
After Wilhelm Roentgen

A comprehensive exhibit of the early history and later development of the Roentgen ray (x-ray) in the United States was displayed during February in the Francis A. Countway Library in the Harvard University Medical Area. It included a collection of tubes used by the first clinical roentgenologist in the United States, Dr. Francis H. Williams, '73, of Boston. (Dr. Williams was the fourth secretary of the M.I.T. Corporation.) A mural of a photograph taken in 1896 of Dr. Williams and Dr. Charles B. Gross shows them working in the basement of the first Boston x-ray laboratory to deal with patients. The laboratory was at M.I.T.

In the center of the display was a two-million-volt Van de Graaff generator used in x-ray treatment at the Philadelphia Oncologic Hospital from 1942 to 1965. Also exhibited were two models of Van de Graaff generators, one of the first million-volt unit used at Harvard's Huntington Memorial Cancer Hospital and the other of the first Van de Graaff used at the Massachusetts General Hospital.

Visitors to the exhibit saw Dr. Wilhelm K. Roentgen's famous 1895 x-ray of his wife's hand and many important manuscripts and letters by scientists such as Madame and Pierre Curie, Dalton, and Crookes.

(Continued on page 60)



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HE TREND OF AFFAIRS

(Continued from page 58)

Portable Capacitance Standard

The National Bureau of Standards in Washington announced recently that a portable 10-picofarad capacitance standard has been developed by Robert D. Cutkosky, '55, and Lai H. Lee. This rugged and extremely stable standard simplifies comparison of the accuracies of capacitance measurements at the Bureau with those of other national laboratories. Twelve such standards have been constructed and are being used in comparisons of the Bureau's calculable gage-block capacitor with other standards.

A seven month evaluation on 11 of the 12 portable standards showed that their order of stability was one part in 10^7 —considerably higher than the portable capacitors built at the Bureau in 1961. When the twelfth standard was shipped by air express to the National Research Council in Canada, a capacitance change of less than two parts in 10^7 was observed after shipment. Additional tests are planned to establish whether the standards can be sent safely through the mail from one laboratory to another.

Grant for Urban Studies

The Joint Center for Urban Studies of M.I.T. and Harvard has received a grant of \$1.4 million from the Ford Foundation to support the research activities of the Center for seven years beginning in the summer of 1966.

The Joint Center was founded in 1959 by M.I.T. and Harvard and has been supported by two three-year Ford Foundation grants and by funds from other foundations and government agencies. It is governed by an Administrative Committee of deans, chaired by Vice-president Carl F. Floe, '35, of M.I.T., and by a Faculty Committee of professors, chaired by Professor Kevin A. Lynch, '47, of M.I.T.

During the coming year the Center will work toward completing a five-year program of advising the Venezuelan government on the development of a new city; expanding a metropolitan Boston studies program; and developing the Center as a source of urban data.

Laser Business Grows

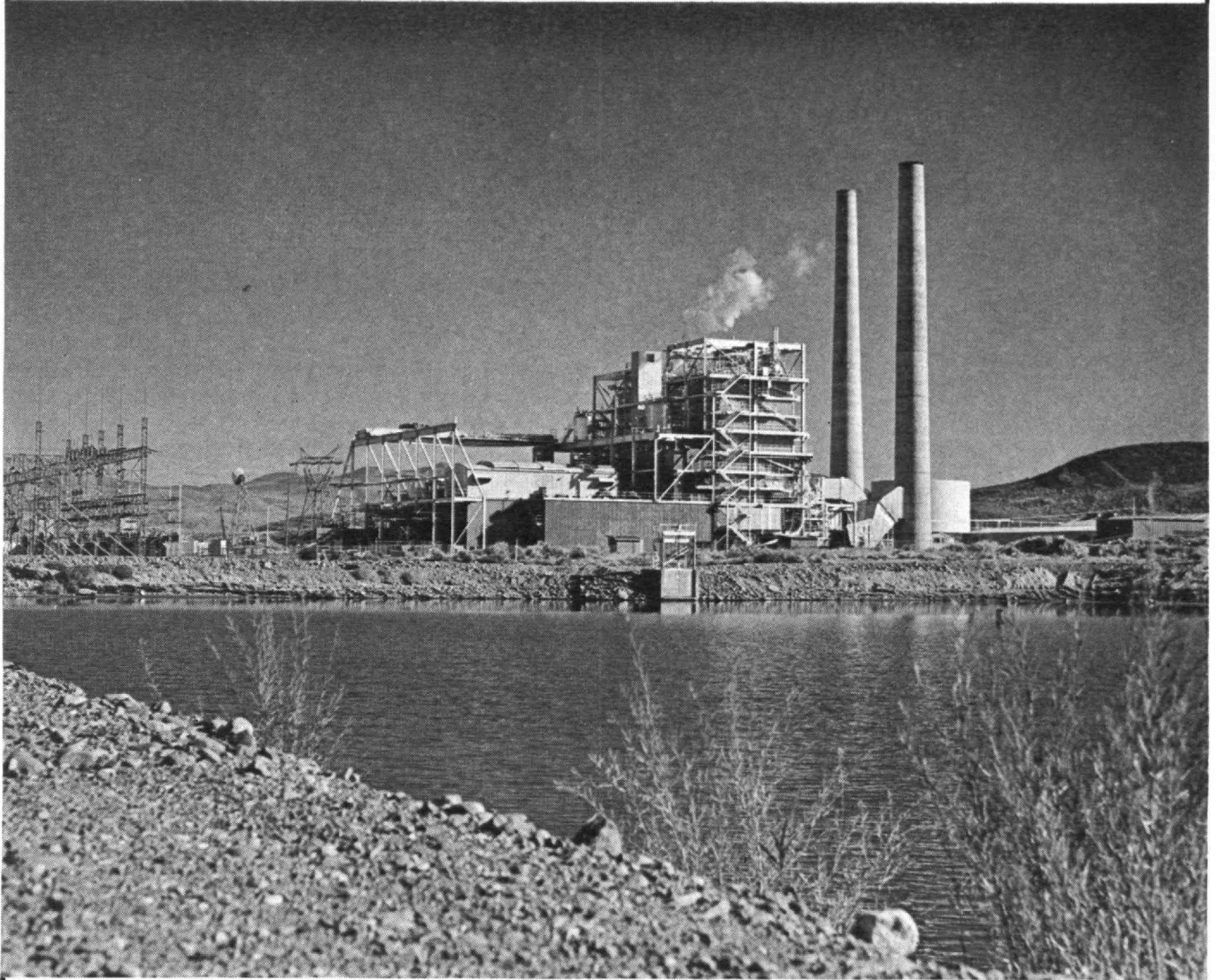
Lasers are big business now. Once thought of as an exotic R&D "adventure," lasers accounted for over \$97 million worth of business during 1965, according to Patrick J. McGovern, Jr., '59, President of International Data Corporation, Newtonville, Mass.

A survey of 1,000 organizations in the U.S. and abroad revealed that at least 367 are working on lasers or related projects, Mr. McGovern said. Of these, 257 are industrial companies, 75 are nonprofit concerns, and 35 are government agencies. Of the total expenditures on lasers, \$40 million was spent in manufacturing and sales, \$42.1 million in research and development, \$13.1 million on application studies.

(Concluded on page 62)



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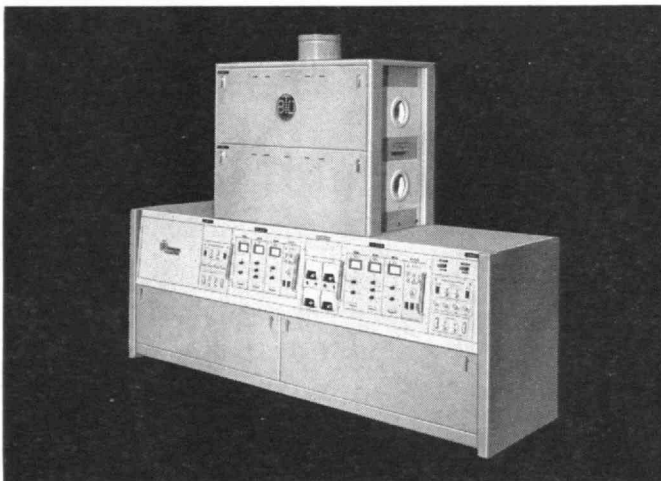
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THE TREND OF AFFAIRS

(Concluded from page 60)

This Summer at M.I.T.

Thirty-one special summer courses, lasting from one to two weeks, will be offered at the Institute this year. Among them will be a new program, "Computerized Simulation of Market and Competitor Response," which is designed to familiarize executives with techniques for testing various marketing strategies. The titles and professors in charge will be as follows:

Beginning June 14—Physical Measurement and Analysis, *Nathan H. Cook*, '50; Plastics in Architecture, *Albert G. H. Dietz*, '32; Industrial Dynamics—Advanced, *Jay W. Forrester*, '45; Concepts of Management Planning and Control Systems—Theory and Technology, *Zenon S. Zannetos*, '55; Fermentation Technology, *Richard I. Mateles*, '56.

Beginning June 20—Photoelasticity and Moiré Techniques, *William M. Murray*, '33; Modern Developments in Heat Transfer, *Warren M. Rohsenow*; City and Regional Planning, *Frederick J. Adams*.

Beginning June 27—Nondestructive Testing, *William M. Murray*, '33; Recent Advances in Biosciences and Applied Sciences Pertinent to Operative Dentistry, *Robert S. Harris*, '28; Nuclear Power Reactor Safety, *T. J. Thompson*.

Beginning July 5—Fluid Power Control, *S. Y. Lee*, '43; Pattern Recognition, *Murray Eden*; Introduction to Probabilistic Systems, *Alvin W. Drake*, '57.

Beginning July 11—Strain Gage Techniques—Lectures, *William M. Murray*, '33; Management of Research and Development, *Edward B. Roberts*, '57; Computerized Simulation of Market and Competitor Response, *Arnold E. Amstutz*, '58.

Beginning July 18—Strain Gage Techniques—Laboratory, *William M. Murray*, '33; The Electron Microanalyzer and Its Applications, *Robert E. Ogilvie*, '52; Engineering Aspects of the Oceanic Environment, *Delbar P. Keily*, '34; Religion and Community Cooperation in Planning, Housing and Architecture, *Paul Oppermann*.

Beginning July 25—Techniques in High-Speed Photography, *Harold E. Edgerton*, '27; The Design and Analysis of Scientific Experiments, *Harold A. Freeman*, '31.

Beginning August 1—Computer-Aided Design, *Steven A. Coons*, '32; Mathematical Programming, *Cecil D. Macrae*.

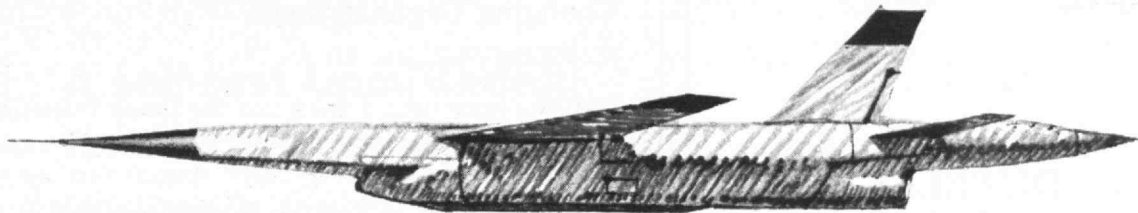
Beginning August 8—Infrared Spectroscopy—Technique, *Richard C. Lord*.

Beginning August 15—Infrared Spectroscopy—Applications, *Richard C. Lord*; Communicating Technical Information, *Robert R. Rathbone*.

Beginning August 22—Electromagnetic Compatibility, *Robert P. Rafuse*, '57; On-Line Computation and Simulation, *Martin Greenberger*.

Beginning September 6—Operations Research in Public Affairs, *George P. Wadsworth*, '30.

Inquiries regarding the above courses should be addressed to: Director of the Summer Session, Room E19-356, M.I.T., Cambridge, Mass. 02139.



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Changing Organizations

(Concluded from page 41)

At the same time, I think that the future I describe is not necessarily a "happy" one. Coping with rapid change, living in temporary work systems (set up in quickstep time), developing meaningful relations—and then breaking them—all augur social strains and psychological tensions. Learning how to live with ambiguity, to identify with the adaptive process, to make a virtue out of contingency, and to be self-directing will be the task of education, the goal of maturity, and the achievement of the successful manager. To be a wife in this era will become a profession of providing stability and continuity.

In these new organizations, participants will be called on to use their minds more than at any other time in history. Fantasy, imagination, and creativity will be legitimate in ways that today seem strange. Social structures will no longer be instruments of psychic repression but will increasingly promote play and freedom on behalf of curiosity and thought.

Bureaucracy was a monumental discovery for harnessing the muscle power of the industrial revolution. In today's world, it is a lifeless crutch that is no longer useful. For we now require structures of freedom to permit the expression of play and imagination and to exploit the new pleasure of work.

The Business of Peace

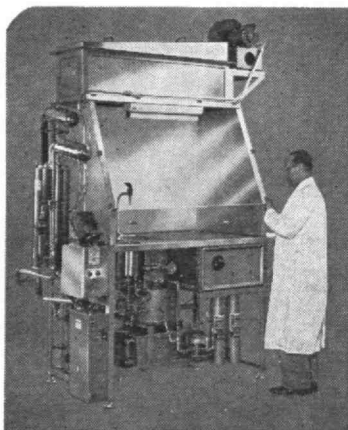
(Concluded from page 44)

Second, despite some well-publicized failures, the less-developed world is progressing. Its gross national production is rising 4 per cent a year while its population increases only 2.5 per cent.

This is not a hopeless job and the alternative may be hopeless for all of us. With the technology and organizational ability of international companies, we can increase the rate of economic development in "less-chance" countries by a factor of two to three hundred per cent and improve our own businesses at the same time.

We have got to work hard on both fronts. Disarmament and peace agreements of the future are not just desirable—they are mandatory. To get them, we must demonstrate that we are ready, with our fellow nations, to pioneer new thinking and new approaches.

At the same time, we must work for peace through economic interdependence. It, and it alone, begins removing the festering causes of war—the poverty that makes men desperate, the ignorance that makes them foolish. We have the mechanism to banish poverty and with it ignorance. Through the multinational corporation, we can transfer capital. We can transplant technology. We can disseminate knowledge. We can build understanding. Since we can do this, I believe morally that we must.



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BY

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President

V. C. Smith, '48
Vice-President
Research & Development

N. A. Everett, '48
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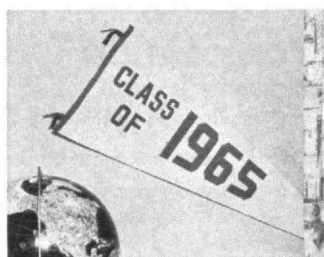
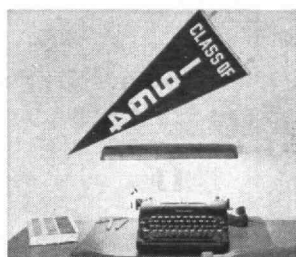
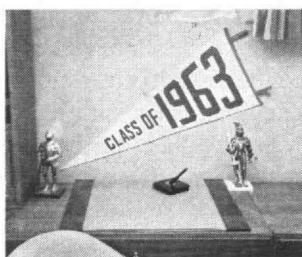
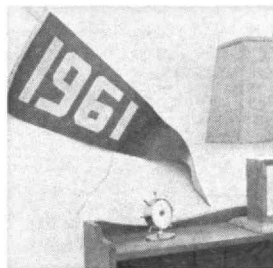
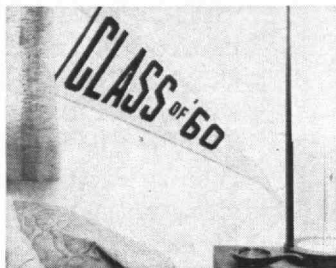
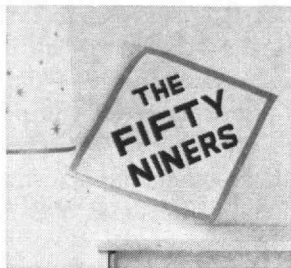
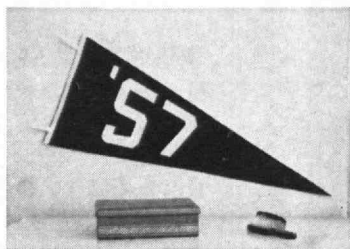
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Experimental and
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NOTABLE NEW BOOKS

SOVIET RESEARCH AND DEVELOPMENT: Its Organization, Personnel and Funds, by Alexander Korol (*The M.I.T. Press, \$11*).

Reviewed by DSR Director F. Leroy Foster, '25

A wealth of material is available to anyone who wishes to undertake a statistical study of research and development in the United States; but when one decides upon similar studies with reference to the Soviet Union, he is faced with an extremely difficult problem. There is little doubt that the author of this book has done an excellent job in accumulating statistics, presenting them, and describing his methods of evaluating the data.

The purpose of the book is "to examine the magnitude and distribution of the national resources allocated to scientific research and development in the Soviet Union." The author makes it clear immediately that he does not propose comparisons with the research and development program of either the United States or of any other country. Presented by way of appendices are nearly 100 pages of statistical data upon which he has drawn for the study.

By way of background, the Soviet organization for research is sketched in considerable detail. As one might expect, with every reorganization of the government there has been a reorganization of the research and development institutions, and this chapter covers all of the so-called reforms up to 1963. It is noted that except for a brief period between 1957 and 1963, research and development organizations have been and now are directly responsible to the central government.

The author next goes on to indicate the size of the research and development personnel in the Soviet, indicating the numbers of both professional and supporting personnel, and then considers the scientific workers by function and training, as well as by age, specialization, position, sex, and nationality. This is followed by a chapter which describes the research and development institutions of the Soviet. With all pertinent data compiled, he then moves to estimate the probable distribution of personnel by the types of activities, which are set forth as basic research, applied research, and development.

A final chapter is devoted to a review of available data on the ruble expenditures for research and development in the Soviet Union. It is made quite evident by the author that such figures as are available are confusing and of little significance. The professional manpower engaged in research and development ap-

pears to provide a much better unit of measurement for determining the total magnitude of the research and development effort.

At the present time, when our Congress is expressing great concern that the federal research programs on the one hand, and the nation's goals for higher education on the other, are in increasing conflict, it is of more than passing interest to have the author make certain observations regarding the problem of the Soviets. For many years they have been greatly concerned that the faculties of their educational institutions are required to spend so much time on their teaching assignments that they are denied the opportunity to conduct much research. Despite the continuing efforts that are being directed to remedying this defect, they are still far short of their goal.

For the statistician concerned with research and development manpower, this book should prove extremely interesting. As the author's approach to the problem is studied, the reader can reach his own conclusions and make quantitative comparisons with the research and development effort in the United States. For the person who is most interested in the approach taken to the problem and the results obtained, he will find that the author in his preface outlines quite clearly his study plan and, in his final chapter or postscript, presents briefly the results obtained and his conclusions.

Recalling that the author determined that the number of professional workers engaged in research and development provided the best measure for estimating the growth in research and development, pertinent conclusions are set forth as follows:

"By this quantitative measure the R & D potential of the Soviet Union has grown at a very high rate. The number of professional employees of the Soviet R & D organizations increased . . . from 125 thousand in 1950 to 486 thousand in 1960. . . . Within these totals we have noted the even faster growth . . . in the number of engineers: from 74 thousand in 1950 to 344 thousand in 1960. . . .

"The expansion of professional personnel has been particularly rapid since the mid-1950's, reflecting no doubt the inauguration of the space program and the intensification of the nuclear weapons development. From 1955 to 1960 the number of employed graduates in the economy as a whole was rising at approximately 11 per cent per year, but the annual increase in the number of professional employees of R & D institutions during the same period averaged 20 per cent—a convincing indication of the high priority assigned to research and development."

(Continued on page 68)

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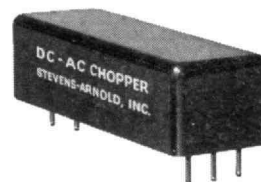
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OTABLE NEW BOOKS

(Continued from page 67)

Book Excerpt

Acceleration and the Law of Gravitation

Suppose you have a billiard table in your house. You put a ball in the middle of the table. It stays there until something pushes it, and this something we call "force." Or you shoot a ball across the billiard table. It moves in a straight line until it strikes the boundary, rebounds, and again moves in a straight line at constant speed. Suppose now we have a billiard table in a train, and the train is running at constant speed on a straight level track. You again put the ball in the middle of the table and it stays there, just as was the case in your house, at rest with regard to the table, though I, standing outside near the track, see that train and table and ball all three move together at constant speed. You shoot the ball across the table, and it moves in a straight line at constant speed, thus in the moving railway train obeying the same law of nature as in your stationary house, the law that any body keeps the same state, whether rest or motion, until something changes its state.

But suppose the train is speeding up, its speed increasing while you put the ball in the middle of the billiard table in the train. Now you find that this ball does not remain at rest, but it begins to move toward the back of the train, first slowly and then more and more rapidly until it comes to rest against the back boundary of the table, just as a stone which I drop does not remain at rest, suspended in the air, but begins to move downward with increasing speed—"falls." So the billiard ball in the speeding train "falls" toward the back of the train. You shoot a ball across the billiard table while the train is speeding up. It does not move in a straight line, but curves toward the back of the train, just as a thrown stone, on earth, does not move in a straight line at constant speed, but curves downward. You say then that in the speeding railway train some force acts on the billiard ball, pulling it toward the back of the train, just as the attraction of the earth pulls downward. You may speculate on this force which attracts things toward the back of the speeding railway train and find its laws just as Newton found the laws governing the force of gravitation. But I, standing on the embankment, near the track, while the speeding railway train passes, see that there is no real force acting on the billiard ball, but when you put it in the middle of the table, left to itself, it continues to move in a straight line at the speed which it and the train had when you

put it there. What happens is that the billiard table and train, speeding up, slide forward under the ball, and the ball thus seems to fall backward toward the end of the train. So, when you shoot a ball across the billiard table in the speeding railway train, I from the outside see the ball move in a straight line at constant speed, but see billiard table and train slide forward under it, so giving you, who are moving with the speeding railway train, the impression of an attracting force pulling the ball toward the back of the train.

You try to find the laws of this force; that is, the laws obeyed by the relative motion which you see. But to me these motions are those of a body left to itself, in a straight line at constant speed, and, knowing the motion of the speeding railway train, the mathematician can calculate the motion which you observe, without any physical assumption, merely as a mathematical transformation from the straight-line motion which I see from the outside to the complicated motion relative to the speeding train which you observe and so derive the law of the latter motion—that is, the law of the fictitious attracting force—to which you ascribe these motions. This, Einstein has done and so has derived a new and more general expression for the law of gravitation, in a way which does not depend on any hypothesis concerning the nature of the force. This law is more general than Newton's law of gravitation, and the latter appears as the first approximation of Einstein's law of gravitation.

—From *STEINMETZ The Philosopher*, the nontechnical writings of Charles Proteus Steinmetz, compiled and edited by Ernest Caldecott and Philip L. Alger, '15; a commemorative volume marking the centennial of the birth of "The Forger of Thunderbolts." Published by Mohawk Development Service, Inc., Schenectady, N.Y. Reprinted with the permission of the editors.

Books You Should Know About

Recent publications especially likely to interest M.I.T. Alumni have included:

The Economic Effects of Regulation, The Trunk-Line Railroad Cartels and the Interstate Commerce Commission before 1900, by Paul W. MacAvoy (The M.I.T. Press, \$10). The author is an Assistant Professor of Economics at M.I.T.

Introduction to Semiconductor Phenomena and Devices, by Lloyd P. Hunter, '39 (Addison-Wesley, \$8.95). This senior-graduate level textbook is by a Professor of Electrical Engineering at Rochester University.

Labor Migration and Economic Growth, A Case Study of Puerto Rico, by Stanley L. Friedlander, '64 (The M.I.T. Press, Economics Monograph Series, \$6).

The University Looks Abroad: Approaches to World Affairs at Six American Universities, compiled under the direction of Allan A. Michie as a report from Education and World Affairs (Walker and Company, Paperback, \$2.50).

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25 Years Ago

It was announced in *The Review* for April, 1941, that "this year brings the retirement of eight members of the Faculty who have been closely associated with the growth of the Institute and whose influence as teachers will long be remembered by thousands of former students.

"They are Professors Charles E. Locke, '96, a member of the Institute's staff for 40 years; Charles E. Fuller, '92, who will be remembered by every student in the Department of Mechanical Engineering since 1892, when he joined the staff; George Owen, '94, internationally known yacht designer, who joined the faculty of the Department of Naval Architecture and Marine Engineering in 1915; Ralph R. Lawrence, '95, who was appointed to the Department of Physics in 1896 and was transferred to the Department of Electrical Engineering in 1901; Arthur A. Blanchard, '98, who came to the Department of Chemistry in 1899; Joseph C. Riley, '98, a member of the staff of the Department of Mechanical Engineering since 1898; Archer T. Robinson, whose admirable qualities as a teacher have enriched the influence of the Department of English and History for many years; and Edward E. Bugbee, '00, who, except for an interval between 1903 and 1907, has been a member of the staff of the Department of Mining and Metallurgy since 1900."

50 Years Ago

At the 50th meeting of the Alumni Council, held April 24, President Richard C. Maclaurin said that he "had been greatly impressed by the activity" of the Council, and that he had "never known any alumni body that held regular meetings and devoted itself so seriously to the problems" of its institution.

"It is a mistake," he continued, "to think that Tech spirit is a different thing from that of other institutions. Whatever apparent difference

there is, is in type rather than in degree. Technology Alumni have always shown a determination to see things through; scarcely anything of importance in connection with the Institute has not been organized or carried on by this body."

Dr. Maclaurin expressed appreciation for the help given him by the Council during his seven years as President of the Institute, and hoped that "in the future the activities of the Alumni Association would not have to be directed so much to the raising of money as in the past. The great problem before the Institute today is that of broadening it [for] it is a little too proud of itself. Technology in [the] future, more than in the past, is to be a national institution with a national and international outlook."

75 Years Ago

"Our annual dinner in honor of the Senior Class took place on last Friday evening, April 3d, at Odd Fellows' Hall, corner of Berkeley and Tremont Streets, and, in all but two or three respects, was a great success," according to the editor of *The Tech*.

"A company of nearly 500 people, including President and Mrs. Walker, and several members of the Faculty and corps of instructors, sat down at 11 tables a little before eight o'clock. At half past eight the chairs at the lower tables were vacated in a body, and the students massed themselves together as near the head of the hall as possible, in preparation for the second part of the evening's entertainment, which proved to be by far the better, and, we are almost led to say, the only redeeming feature. . . ."

■ The Lounger, however, disagreed in an adjoining column with the Editor's opinion. He dealt with the "remarks on various subjects [made] by some persons who had been privileged to speak. Things went off very smoothly for a time, and the Lounger really was beginning to lose sight of some remon-

strances on the part of the inner man.

"The first speeches were excellent, with one unimportant exception, and everybody was pleased. Then a pale-faced individual arose, and, with only slight evidences of embarrassment, started off in smoothly flowing style, [but] the rest of his speech was more or less of a blur."

100 Years Ago

At the 49th meeting of the "Government," held April 12, 1866, approval was given to recommendations contained in a report submitted by the Committee on Instruction with respect to the salaries of the Faculty. These recommendations read in part as follows:

"... for the current year of the School of the Institute included between the first Monday of October, 1865, and the first Monday of October, 1866, the Salaries of the several Professors be as follows:

"First, the Professors of Mathematics, Mechanical Engineering, General and Industrial Chemistry, and Analytical Chemistry and Metallurgy shall be entitled each to \$1,500 for their regular services in the School, and \$500 each for their share in the Evening Courses provided by the Lowell Fund.

"Second, the Professors of English and Modern Languages shall be entitled each to \$1,000 for their regular services in the School, and \$500 each for their share in the Evening Courses provided for by the Lowell Fund.

"Third, the Professors of Architecture and Civil Engineering shall be entitled each to \$1,200.

"The Committee further recommends that from and after the first Monday of October, 1866, the salary of each Professor whose Department shall be completely organized and in full operation shall be \$2,000 per annum, payable by quarterly installments."

As recalled for Review readers by the late H. E. Lobdell, '17.

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Class News



'95

Our thanks to the American College of Hospital Administrators for a copy of the Ninth Congress on Administration with honors to **Alfred P. Sloan, Jr.**, who won the Hospital Group's 1966 Book Award.—**Andrew D. Fuller**, Secretary, 1284 Beacon St., Brookline, Mass.

'96

Harold S. Boardman joined us in course I in our Senior year after graduating from the University of Maine where he became President for eleven years. He sent a very interesting letter in acknowledging a Christmas card. "I spent many happy months in the forests of Maine. I took parties into the headwaters of all the principal rivers on the water power investigations and in 1912 took my wedding trip in a canoe on the West Branch of the Penobscot. We were out six weeks. I was at one time a registered guide and knew how to handle a canoe on 'swift' water which is different from 'rough' water. I have been nearly struck by lightning, capsized in Frenchman Bay with three others to save, and been threatened with a gun by one of my former students! However I am still here!"

Myron E. Pierce of 6 Bancroft Road, Wellesley Hills, died in Miami, Fla., on February 4, 1966. He had been vice-president of the Class and only recently succeeded **Henry Hedge** as Assistant Secretary. After three years study of Civil Engineering he entered Harvard Law School and was graduated with a degree L.L.B. in 1898. He became a corporation lawyer with an office at 6 Beacon Street, Boston. He was a member of the Boston City Council and leader of the minority. He represented the Back Bay in the State Legislature and for several years was Moderator of the Town of Wellesley. Despite the demands of a busy lawyer, he found time to aid in public affairs; as a Member of the Committee for Phillips Brooks Statue; Committee for five Liberty Loans; Copley Society; the Sanhedrin, Congregational Club and several social clubs. He was also a trustee of Babson Institute. His wife, **Blanche (Cochran)** died in 1960 and he left no immediate relatives. His funeral services were conducted by Reverend **John E. Wallace** at the Wellesley Hills Congregational Church near his residence; burial was in the family lot at Mount Auburn Cemetery, Cambridge, Mass. A floral tribute was sent from the Class which was represented by **Davis and Driscoll**.—**James M. Driscoll**, Secretary, 129 Walnut Street, Brookline, Mass.

'99

Avery Robinson was born January 21, 1878. He took a special course in architecture at M.I.T. After his retirement from the Chess & Raymond Company of Louisville, Ky., he was interested in his farm in New Lebanon, N.Y. He died May 11, 1965. He is survived by his daughter, **Mrs. Carley Dawson** of Washington, D.C. . . . On January 31, 1966, the Alumni Council elected **Percy W. Witherell** to be the class representative.—**Percy W. Witherell**, Secretary, 1162 West St. Wrentham, Mass.

'00

Stanley Fitch and your Secretary were entertained at luncheon recently, by **Jim** and **Harriet Patch** at their home in Carlisle. We found them in good health except for **Jim's** arthritic lameness for which your Secretary had the greatest sympathy by reason of his own similar infirmity. **Jim** was full of enthusiasm about his recent trip to Beirut which was the scene of his teaching experiences immediately after graduating from M.I.T. His photographs were excellent and we had a most delightful afternoon.

Your Secretary also called recently on Professor **L. S. Smith** who is living in a Rest Home in Newton.—**Elbert G. Allen**, Secretary, 11 Richfield Road, West Newton, Mass.

'01

The only news I have to offer is the passing of more classmates. **Philip S. Baker, II**, died on December 24, 1965, **Allen B. McDaniel** on December 18, 1965. I have no further information about these two. If any of you can supply further news I will gladly relay it to the class. . . . I have heard nothing more from **Mrs. Peterson** and presume that she is still in the hospital.—**Theodore H. Taft**, Secretary, P.O. Box 124, Jaffrey, N.H. 03452

'02

The passing of one of our classmates is recorded in *The Day*, New London, Conn., Tuesday, January 18, 1966, and we quote—"Stephen Ayrault Gardner, 86, of 792 Nantauk Ave., retired plant engineer and assistant secretary and treasurer of General Dynamics/Electric Boat,

Happy Birthday

In April one alumnus will celebrate his 90th birthday; 10 alumni will become 85; nine will reach the age of 80.

April, 1876—**JAMES A. PATCH**, '00, on the 20th.

April, 1881—**CLARENCE M. JOYCE**, '03, on the 1st; **JOHN J. A. NOLAN**, '03, on the 3rd; **GEORGE E. KERSHAW**, '03, on the 4th; **HOWARD T. CHANDLER**, '01, on the 6th; **HENRY L. LYMAN**, '04, and **BURTON G. PHILBRICK**, '02, on the 14th; **LESLIE CLOUGH**, '05, on the 17th; **Mrs. ELIZABETH S. MACDONALD**, '08, on the 20th; **JOHN W. AGER**, '04, on the 26th; **STANLEY N. WHITNEY**, '11, on the 28th.

April, 1886—**CHARLES E. MEULENDYKE**, '10, on the 12th; **GARDNER S. GOULD**, '07, and **KARL B. KILBORN**, '11, on the 16th; **PERCY A. FALKENBERG**, '10, on the 18th; **ROGER C. RICE**, '08, and **RICHARD R. TAYLOR**, '10, on the 23rd; **ARTHUR B. APPLETON**, '08, and **CLIFFORD B. RUSSELL**, '08, on the 24th; **ALLSTON K. THORNDIKE**, '07, on the 27th.

died late yesterday afternoon at the Mary Elizabeth Convalescent Hospital, Mystic, where he had been a patient three years.

"Mr. Gardner began his career with EB in August 1904 when he was employed in the company's drafting room in New Suffolk, L.I. He was transferred to the old Fore River Shipyard, Quincy, Mass., in 1906, and became EB's West Coast representative at the Seattle Ship and Dry Dock Construction Company two years later. He was sent to St. Petersburg, Russia, in 1912, to aid in the assembling of submarines for the Imperial Russian Navy. After his return to this country he was made head of EB operations in Fall River, Mass., and remained in that position 12 years. He returned to Groton in 1925 to assist in the construction of four submarines for the Republic of Peru.

"Mr. Gardner became plant engineer in 1933, the year EB began to build submarines for the Navy. He played a major role in the expansion of EB's capacity for production during World II. At that time, the Groton yard expanded from three building-ways to 22. Mr. Gardner considered this work the high point of his career. He was honored in August 1954 by EB officials for his 50 years of service. In July of the next year, he became adviser for plant maintenance. He retired in 1960.

"Mr. Gardner was born July 17, 1879, in New London, the son of **Stephen A.** and **Mary Sherman Gardner**. He was a member of the 1902 graduating class of M.I.T. where he majored in naval architecture. He was the husband of the late **Florence Loomis Gardner** who died in 1955. Mr. Gardner was a 50-year member of the Navy Architects and Marine Engineers Society and a charter member of the New London Country Club. He was the last member of the original whaling families here. The Gardner family long had been connected with the whaling industry and steamship lines. Mr. Gardner leaves a daughter, **Mrs. Joseph W. Balius**, of New London, and a granddaughter."

It was brought home to me that time flies when in February I received the 50-year Veteran Medal from the Grand Lodge of Massachusetts marking 50 years membership of Essex Lodge, A.F. & A.M. in Salem. Likewise this month I become a member of the "85 year Club."—**Burton G. Philbrick**, Secretary. 18 Ocean Ave., Salem, Mass. 01970.

'03

Your Secretary enjoyed the highly interesting meeting and luncheon of the M.I.T. Alumni Officers at the Faculty Club during January. I was guest of our Counselor, **Ike Atwood, II**, and although the campus was high with winter snow, the enthusiasm of those attending seemed unabated.

The obituary news of the passing on December 1 of our classmate, **Ernest J. Cronenbold, XIII**, has been delayed; he recently celebrated his 90th birthday. Ernest was a retired construction superintendent, who worked on the Empire State Building and New York subways. He was born in New York City. He was graduated from M.I.T. in 1903, after attending Mount Hermon Academy in Northfield, Mass. He retired in 1931, having worked most of his busy career for the Post-McCord Steel Construction Company. His wife Ida died in 1941. Surviving are two sisters, Miss Evelyn Cronenbold and Mrs. Elizabeth Geidel, both of Bayonne, N.J.

A recent letter from **Bob King, III**, gives us some news of interest regarding our classmate, **George B. Seyms, II**, of Wayne, Pa., who recently passed away. Bob had phoned George's family recently and learned from a close friend that during the early years of Mr. and Mrs. Seyms' married life they had lost their several children when young. However, they adopted other children whom they raised with all the loving care and affection possible. Then a few years ago Mrs. Seyms died, to be followed by George last June. He knew some time before his end that his time was limited. Accordingly, he carefully set up funds for the now grown up children and even an amount for M.I.T. A glowing epitaph to our cherished classmate, **George B. Seyms**.

A gift of \$2 million by **Frank S. MacGregor** of the Class of 1907 toward the cost of an undergraduate men's dormitory for M.I.T. has been announced by **Dr. Killian**, Chairman of the Corporation. Mr. MacGregor has consented to the naming of the dormitory in his honor, at the request of the Corporation. The grant will enable M.I.T. to make definite plans for the construction of the new Dormitory to cost more than \$4 million and to house 300 students. It will face Memorial Drive on the West Campus and be the first of two dormitories which are being designed by **Pietro Belluschi**, Dean Emeritus of the School of Architecture in association with **Architects Collaborative**.

Our classmate, **William V. McMenimen, I**, of 75 Prospect St., East Orange, N.J., passed away December 26. Bill appears

to have set an unequalled record among our Alumni in his field of engineering, yet modestly withheld his varied accomplishments until his death. He was born in East Cambridge November 23, 1881, graduated from Cambridge High School, and entered with our class in civil engineering. He left six months before receiving his degree, being offered a job as rodman by the firm constructing the Hudson and Manhattan tubes. "I always meant to go back and finish up some time, but I never did," he recalled, "in later years I was always too busy." Three years later, at the age of 24, he was made general superintendent of construction of all four tunnels under the Hudson River and others in New York and Jersey City for the Hudson and Manhattan Railroad. He probably was the first American to be in charge of a major underwater tunnel project. In those days the English were leaders in tunnel construction. An English firm was in charge of construction of the first tube and almost all supervisory employees were Englishmen.

William originally joined the Raymond firm in 1911, as superintendent in the building of a high ore-loading dock in Marquette, Mich., after completion of that job, he took charge of concrete construction of ore-loading docks at Chicago. In 1913 he left Raymond to form his own company as "Dock Constructors" with a group in Hoboken and went into subway construction. After five years, however, he returned to Raymond as a Director and Vice-president of construction. One of Bill's outstanding accomplishments was in his role as Chairman of the Executive Committee of Contractors, Pacific Naval Bases, from 1939 through World War II. This project involved more than 30,000 men and spanned the area from Hawaii to the Philippines. The group of contractors built U.S. bases in the Philippines, Hawaii, Midway, Wake, and Guam, and elsewhere in the Pacific. Mr. McMenimen received the Meritorious Civilian Service Emblem from the Navy for his outstanding achievement in this unprecedented project. He also received an award from The Moles, a men's construction organization. It read "In recognition of his important contribution to naval construction in the Pacific Ocean at the time of his country's greatest peril." On December 7, 1941, Bill was aboard a ship 30 hours out of Pearl Harbor, headed for San Francisco, when the vessel's radio received word of the Japanese attack. On arriving at the west coast, he boarded a plane to return to Pearl Harbor, where he supervised reconstruction of the base. He had narrowly escaped capture by the Japanese. He was on the last plane from Guam on November 30, while leaving for the U.S., when he learned that 1400 of his Company's men were captured on Wake and Guam.

Among Mr. McMenimen's big domestic projects was the Golden Gate Bridge, San Francisco, for which the Raymond Company sank the piles. After the war William organized and became Chairman of the Executive Committee of Construction Management, Engineering Associates, which directed a \$200 million U.S. Air Force construction project in France.

Subsequently he supervised work on similar air bases in Spain. Raymond International is currently doing work in Vietnam with **Morrison Knudsen Company, Inc.**, another heavy construction concern.

On January 14, 1964, Mr. McMenimen and his wife, the former **Emily Jane Seeds**, celebrated their 60th wedding anniversary. They were married in Boston January 14, 1904, and shortly thereafter moved to New York. They have lived here since, except for a brief residence in Michigan. During his long career, William visited many countries throughout the world. He built a refinery in Curacao, an electric plant in Japan, roads and water systems in Colombia, as well as facilities in Liberia, China, Turkey and the East Indies and in several South American countries. In 1953, when he retired as President of the Raymond Pile Company, which later became Raymond International, he was honored by 250 employees of the company for outstanding service to the company at a testimonial dinner at the Waldorf Astoria in New York. He was presented a bronze plaque depicting in bas relief many of the construction projects with which he was associated in the United States and throughout the world. In 1950, upon completion of construction of the Port of Monrovia, Liberia conferred on Mr. McMenimen the Order of the Star of Africa, Grade of Commander. He was also a life member of the Consulting Constructors Council of America and a past President of the General Contractors Association. He also was an honorary life member of Local 1456 Dock Builders and Pile Drivers Union.

Besides his wife, Mr. McMenimen leaves two sons, **Francis W. McMenimen** of Rumsen, retired Director of the Suggestion Programme of Public Service Electric and Gas Company, and **Robert O. McMenimen** of Maplewood, State Editor of the Newark, N.J. News, and three grandchildren.

The new address of **Clarence M. Joyce, V**, is 31 The Crescent, Montclair, N.J. Our birthday greetings go to **Louis B. Rapp, III**, for his 85th milestone on February 1 at Gainesville, Fla.—**John J. A. Nolan**, Secretary, 13 Linden Avenue, Somerville, Mass.; **Augustus H. Eustis**, Treasurer, 13 State St., Boston, Mass.

'04

The following information was forwarded by Mrs. Mary Hayward and received by her in a letter from our Class Vice-president, **Amasa Holcombe** who is living in St. Petersburg, Fla. He and Mrs. Holcombe extend a warm and sunny invitation for Mrs. Hayward to visit them on Florida's west coast any time of the year. He says she would find many '04 friends to visit including **Walter Hadley's** widow, **Alice**, who is at New Port Riebeck not too many miles away, the **Lewis Newells** who are at Bradenton, **Ethel Coupe** at St. Petersburg Beach, and the **Marrtons** and **Freddie Pierce** there in St. Petersburg.

to mention a few. Fortunately this month we have no deaths to report.—**Eugene H. Russell, Jr.**, Treasurer, 82 Stevens Road, Needham, Mass.

'05

I omitted one very important matter in my notes for February 1965. It was a must in my thinking for some time previously, but it got by me at the proper time. **Gilbert S. Tower, XIII**, the youngest member of our class, became the final entrant to the '05 Octogenarian Club on February 15, 1965. Belated congratulations, Gib, also a continuance of good health.

Another omission. At Christmas time I had a wonderful Christmas letter from **Hal Robbins, I**, which got by without comment. Hal's hearing, as I have previously reported, was "destroyed" by the noise of an explosion in March 1963. He felt he had a good case for damages, but technicalities delayed prosecution with a hearing finally to take place this March in the Superior Court. He says that his attorneys were not enthusiastic about his prospects, "and I don't blame them, considering the inadequate medical information available to them at the time." So Hal went to work. He studied otiology, making trips to "specialists" all the way from Phoenix, to Los Angeles, to Australia and Baltimore. I wish I could quote all of his letter (eight paragraphs) telling of his study and research and claiming that the study of otiology today has been superficial. I can easily infer that his scientific and engineering training enabled him to go very deeply into the subject. I trust he will be rewarded when his case comes to trial. I am quoting a few paragraphs, which have to do with other angles of his personal life:

"Aside from the wrecked ears, my general health and physical condition continue to appear reasonably satisfactory and all that can be expected in one staggering under my heavy burden of years. My vision remains absolutely perfect following the cataract surgery, as regards the right eye, but there has been some deterioration in the left during the past few months, not however beyond the point of remedy by a slight change of glasses. I discontinued wearing contact lenses several months ago, but may try them again. In general I can't recommend them except for those women who feel spectacles detract from their appearance, which I believe they do in almost all cases. Notwithstanding the excellence of my vision, the eyes do tire readily, and I have to restrict their use for reading, writing and other close work. There have been no sessions of our Spanish class for several months because of the poor health of our very capable and highly esteemed teacher, but we are hoping she will be able to resume soon. I have been keeping up through the medium of correspondence with my Spanish friend in Europe, and by reading the Spanish edition of Reader's Digest. I recently traded in an old portable typewriter I was not using for a

new one of Swiss manufacture with a Spanish keyboard. Spanish is a much better language than English; in fact, I think a jury of impartial linguists would agree it is the best of all languages—beautiful, expressive, consistent. In Spanish, words do have multiple meanings, as in English, but they do not have multiple pronunciations (bow, row, —ough) nor multiple accents (en'trance, entrance'). I am also studying astronomy as another hobby, with the aid of a celestial globe, an Ephemeris and a Sky Atlas, and endeavoring to re-learn the names of the stars and constellations, as well as keep track of the positions of the planets; and speaking of planets, neither I nor probably anyone now living will see what I vividly remember about 25 years ago—all five naked-eye planets visible in the evening sky at the same time. This may all be evidence of second childhood, since I was very much interested in astronomy when I was in high school. These hobbies are real life-savers however, since my mutilated hearing forces me to be a social outcast, cut off from the enjoyment of music, drama and group activities of all kinds, which is doubly unfortunate since I was already an extreme introvert by heredity."

Again **Len and Beatrice Cronkhite** are vacationing in Tucson, Ariz. At the risk of causing battle with **Roy Allen** and **Hal Robbins** of Phoenix I quote from Len's description: "There is a certain climatic magic, special to Tucson, which differentiates it from other parts of Arizona. We tend to bore people attempting to explain it. You may as well be subjected. This particular plain area of perhaps 30 to 50 miles is of 2400 feet elevation surrounded by craggy mountains lifting another 3000 feet or more around about us. An-

nual average humidity nine percent. Through the clear skies the sun comes direct—hot in the daytime. Nights invariably 30 degrees cooler. No other Arizona area quite duplicates this setting. For four months we become nomads of this circumferential cacti desert, in what in another connection Kipling described as 'Great spaces washed with sun.' Apparently they are also recuperating, as Len refers to two surgical operations (since our 60th reunion).

Roy Allen sends a nearly full-page clipping from the *Missoulian* (Mont., Sunday, November 28, 1965), a story on **Charles Horace Clapp III** entitled "A Giant Among Geologists." Here again is a wish that it could be reprinted complete, because it is a very proper recognition of a self-made man. In spite of the efforts of class secretaries to acquaint classmates with life stories of their old pals, from graduation to grave, there remain untold stories of fame, heroics, etc., which lack of space forbids. At the time of Charlie's untimely death in 1935, we reported as to his achievements as fully as space would permit. However, I must quote from a caption underneath a photo of Charlie and assistants on a mountain top: "In boots and sun tans Dr. C. H. Clapp was an indefatigable and accurate field man rather than a theoretical geologist. With plane table, pocket barometer and compass, he laid the groundwork for most of the geological exploration going on in western Montana today. His reconnaissance maps are still used." Thanks Roy. Every word of your letter and the clipping would be interesting to the '05 men, who remember Charlie. I do quote this bit of Roy's letter, "I went back to study with Charlie in 1909 and a few years later was with him on a geological survey

Deceased

ALFRED P. SLOAN, Jr., '95, February 17
MYRON E. PIERCE, '96, February 4*
CHARLES C. BOLLES, '97
AVERY ROBINSON, '99, May 11*
NORMAN P. ROOD, '99, May, 1964
ALLEN B. MCDANIEL, '01, December 18
STEPHEN A. GARDNER, '02, January 17
ERNEST J. CRONENBOLD, '03, December 2*
WILLIAM V. MCMENIMEN, '03, December 26*
GEORGE E. ATKINS, '04, December 14
CLAYTON M. SIMMERS, '05, December 24*
ROBERT L. YOUNG, '05, December 25*
JAMES W. KIDDER, '06, January 25*
JOHN M. FRANK, '07, January 18*
STILES O. CLEMENTS, '08, January 15
CHARLES J. BELDEN, '09, February 1*
LAURENCE R. FORREST, '09, June 16
EDWARD E. WELLS, '09, February 4
FREDERICK D. RICH, '10, August 13
PAUL KELLOGG, '11, January 10*
NATHAN LEVY, '11, October 4
ARTHUR CAMPBELL, '12, July 18
HENRY W. CODDING, '12, November 18
CARL A. SANBORN, '14, August 31*
WILLIAM R. THOMPSON, '14*
WILLIAM L. CAMPBELL, '15, February 13
ANDREW J. STIVERS, '15, December 3*
L'ROCHE G. BOUSQUET, '16, January 19
ROBERT F. HART, '16, December 14
WALTER S. STEWART, '16, October 23
JAMES L. WEAVER, '16, December 17

WILLIAM D. CANAN, '17, December 20*
WILLIAM A. CLARK, '17, September, 1964*
HAROLD F. EASTMAN, '17, December 12*
CLAUDE T. CRAPO, '18, December 12
MAURICE N. LANDIS, '18, December 10*
HAROLD F. O'DONNELL, '18, October 19
CARLTON E. TUCKER, '18, January 17*
H. STANLEY WEYMOUTH, '19, January 12
OSWALD CAMMANN, '20, January 28
ARTHUR L. DOPMEYER, '20, March 25, 1965
WINFIELD S. LIBBEY, '21, December 28*
IRVING G. SMITH, '21, October 31*
GEORGE J. BERGMAN, '22, March 29, 1965
ALBERT S. RAIRDEN, '22, October 23, 1964
GEORGE W. HALL, Jr., '23, October 16
MELVILLE F. TAYLOR, '24, May 17*
ROYAL D. PACKARD, '26, October 29
EDMUND I. KARP, '27, October 19
HAROLD L. LEVINTON, '30, January 18
RICHARD J. MARCUS, '32, February 5
HERBERT E. KORB, '33, December 5*
EMIL T. NEUBAUER, '33, January 22
J. E. ANDRE BOUCHARD, '34, November 12
WALTER C. WOODING, Jr., '34, October 1*
FRANKLIN M. NEAL, '35, September 29
BYRON F. PORTER, '36, September 14
JOHN F. MATTHEWS, '48, November 23*
HENRY C. MAULSHAGEN, '48, June 28, 1964
MICHAEL W. MARESCA, '53, January 18
DONALD E. PICKLES, '53, January 17*

*Further information in Class News

in British Colombia. Really one of our distinguished classmates."

Whenever I need a story of a classmate attaining national fame, I merely write to **Hub Kenway**, and back comes news that "Doc Lewis has done it again." I had referred to it briefly in advance but now, "Doctor **Warren K. Lewis**, Professor Emeritus and honorary lecturer and former head of the Department of Chemical Engineering at M.I.T. received the National Science Medal on December 7, 1965." Hub attended a reception in honor of this award in the Warren K. Lewis Room at M.I.T. on Jan. 21, 1966. Doc's wife, two sons and one daughter were in attendance, also one son-in-law. Hub adds, "Doc in good shape and as articulate as usual."

Captain **Clayton M. Simmers, XIII** died in Alexandria, Va. on Friday, December 24. He had been in poor health for a long time. I quote from a clipping from the Boston Herald:

"Funeral services for Capt. Clayton Miller Simmers, USN-Ret., 87, industrial manager of the Boston Naval Shipyard from 1923 to 1930 and supervisor of naval shipbuilding at the Fore River Shipyard from 1934 to 1941 will be held at 10 a.m. tomorrow at Fort Myer, Va. Capt. Simmers, who died Friday, (December 24, 1965) will be buried in Arlington National Cemetery. A graduate of the U.S. Naval Academy, Class of 1902, he also received a degree in naval architecture from M.I.T. in 1905. During his tour of duty at the Boston Naval Shipyard the frigate Constitution was reconstructed, and while ranking naval officer at Fore River, ships such as the aircraft carrier Wasp, the battleship Massachusetts, the cruisers Quincy and Vincennes and the destroyers Farragut, Phelps, Clark, Moffat, Balch, Gridley, Craven, Benson and Mayo were built. **Capt. Simmers leaves his second wife, Mary (Proctor) Simmers of Alexandria, Va.; a son, Capt. Clayton Rogers Simmers USN-Ret., of Jacksonville, Fla., and a daughter, Mrs. Harry W. Englund of Newton Square, Pa.**"

Last month I reported the death of Bob Young. The obituary in the Lawrence, Mass. Eagle-Tribune is as follows: "**Robert L. Young, 82**, died Saturday at Hale Hospital in Haverhill (December 25, 1965). Mr. Young was born in Haverhill, and had lived in North Andover for over 45 years. Before his retirement he was employed by the former Champion International Paper Co. He had also been employed by the S. D. Warren Paper Co. Mr. Young was a member of the Class of 1905 at Massachusetts Institute of Technology. Surviving are his wife, Minita, (Kimball) Young of Andover; two sons, Robert K., of San Francisco, Calif., and Philip of Methuen; also six grandchildren. Funeral services will be private."

Changes of address: **Barry C. Eastman, VI**, c/o Dr. Wm. P. Murphy, Jr., 1840 So. Bayshore Lane, Miami, Fla. 33130. **J. Wallace Taylor**, 2609 Harrison St., Cincinnati, Ohio 45211. Apparently this is where he landed when he was evacuated by turnpike construction.—**Fred W. Goldthwait**, Secretary, Box 32, Center Sandwich, N. H.; **Gilbert S. Tower**, 35 North Main St., Cohasset, Mass.

'06

In the March notes you were told that **Jim Kidder** had been taken, on January 9, to a nursing home in Lexington, but it was not to be for long. On January 25 his months and years of confinement ended. A service was held on the 28th in the First Baptist Church of Arlington at which Bertha, Sherman, Marion, and I represented the class. Letters of sympathy were sent promptly to his sister Mary and the son and daughter—**James Norton Kidder** of Winchester and Mrs. William A. Sanderson (Marsha) of West Simsbury, Conn. There are five grandchildren. His wife Alma (Stone) had died in January 1959. A note from Mary has just come, in which she agrees with me "that my brother's passing was a blessing after his long illness and would not wish him back."

James William Kidder, VI, S.B. Theta Xi, was born in Newburyport, October 1, 1883, but the family moved to Somerville where he graduated from the English High School and entered and graduated with us, being a member of the E.E. Society and his thesis, with E.S. Manson, was to determine the power used in the air brakes of the Boston & Worcester Railroad cars. Joining the NET&T Company, Traffic Department, he served that one company in various executive posts, being Transmission Protection Engineer when he retired in 1948. He had been an Arlington Town Meeting member for 10 years, also a member of the School Committee, being its chairman for a time, also the chairman, I believe, of a special committee to study the possibility of using street telephones (in booths) to supplement the fire alarm system. A long-time member of the Arlington Baptist Church, he had been on the Board of Deacons. He served his Town and Church.

What **Jim Kidder** has done for M.I.T. through the years, especially for its class of 1906, hardly needs telling, for as **Tom Hinckley** said in his report at our 50 year reunion, Jim is Mr. '06. Until our 51st, our class constitution provided for the election of only two officers, Secretary-treasurer and Assistant Secretary-treasurer. Jim was the secretary-treasurer for 38 years until **Harold Coes**—elected president in '56—died in '58 and Jim became president. During those 38 years he had maintained the card file, mostly only addresses, unfortunately, and carried on necessary correspondence with the alumni office as well as with classmates and sent letters of sympathy to them and widows. Planning for our five-year reunions was his responsibility too, handling them almost alone except for the 25th and 50th with some help.

You may recall that at our 30th he proposed "that the class publish a Thirty Year Book" and "it was agreed such a book would be worthwhile." The quotes are from the letter which accompanied his questionnaire and a miniature "mock-up" of the cover. Inside the "mock-up" Jim tells the why and wherefore and I would like to quote part of it because it is so typical of him: "The idea is not to fea-

ture outstanding achievements but to relate the simple story of what the thirty years has meant in the life of the persons whose names are on the class roll. The path may have led a long way from the early technical direction and the work entered into may have been far removed from that field but for the purposes of this book that very diversion may make the story more readable. What life does to folks is the theme to which everyone responds. What is more interesting than an honest autobiography? Tell us where you are; how you got there; what you are doing; what your hobbies are; something of your family; a bit of your own philosophy of life; the homelier the better, —"

Jim has said that the letter was being sent to the 500 names on the class list and that if sufficient replies were received to justify proceeding with the volume "we will act accordingly. On the other hand, if returns are not sufficient, we will go no further." From the 500 letters he sent, only 80 odd replies were received, of which about 90% contained the "autobiography" he wanted. It was felt that the response was not adequate and the Thirty Years After died on the vine. However the "careers," with family facts, etc., that were received have been very useful, as time marches on. Having been so closely associated with **Jim Kidder** for over 45 years perhaps you can imagine how much I mind his passing and how much I shall miss him—as I know you all will too.

Wouldn't YOU like to take a "look back" and write about it to—**Edward B. Rowe**, Secretary-Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181.

'07

A post card from **Willis Waldo, I**, from Panama City told me he was engaged in checking over the many industrial projects he has in Central America, especially in Panama. . . . **Ed Lee, I**, sent me two newspaper clippings from Fort Myers Beach newspapers telling of an exhibition of paintings done by the late **Clare C. Hudson** and held at the Fort Myers Beach Art Association Art Center on Estero Boulevard. The display was held for a week. "The portraits done in many styles were painted by Mrs. Hudson over a period of years from 1905 to 1962. Hosts at the reception were her sons, **Gerald Hudson**, and County Commission Chairman **Julian Hudson** and their wives. Until her death in 1962, Mrs. Hudson and her husband, **Prof. Ralph G. Hudson, VI**, spent many winters at Fort Myers Beach." Mrs. Hudson was a graduate of the Massachusetts Art School and studied in the studios of **Sam Thal** and other artists in Boston.

An Alumni Register form sent to me January 31 contained the information that our classmate, **John M. Frank, VI**, had died on January 18, 1966. The Register had received this information by letter and there were no details given. I have written to the family expressing the sympathy of the Class and asked for more de-

tails. John was always an outstanding member of the Class and in these last years I have gone to him for advice and counsel on many Class matters. He was a most faithful attendant at our Reunions. Of the fourteen Reunions that we have held, John missed only one, the 52nd, in 1959.

I had the privilege of doing business with John many years ago. The Whitin Machine Works bought a number of very large Ilg ventilating fans for installation in our Foundry Head House. John made a personal trip to Whitinsville and supervised the installation which proved to be most satisfactory. We always associate John with Stud Leavell and Sam Marx. No Reunion was really underway until these three had arrived. They were inseparable throughout the Reunion. John and Sam Marx had known each other intimately from boyhood, and Sam's death just two years ago was a severe blow to John. I received a note from John's daughter, Mrs. Mary F. Rothschild thanking me for my message of sympathy from the class. She said John had been ill, with nurses round the clock since November of 1964. I quote, "He still continued to be interested in everything. His mind was active and acute until he died." I gathered the following from the obituary notice, "Born in Natchez, Miss., he had lived in Hubbard Woods for 47 years. He was a retired board chairman of the Ilg Ventilating Company for which he had worked for 50 years. He was a past president of the Jewish Federation of Chicago and of the North Shore Art League, a trustee of Illinois Institute of Technology and of Carleton College in Northfield, Minn. He was named in 1960 to the Golden Agers of the Jewish Community Centers for outstanding contributions to the community. Survivors include three married daughters. The funeral was private."

On page 34 of the February Technology Review is an article on the \$2,000,000 Dormitory gift made by our Classmate, Frank S. MacGregor, which I have mentioned in detail in the '07 notes for March 1966.

A long letter from Jim Garrett, I, gave me an outline of his business activities since leaving M.I.T. Jim says, "As for work, it's been 'All Wet' since leaving M.I.T.," for all his activities have had to do with water supplies for various cities and states. Starting with an Insane Asylum in East Gardner, Mass., where he worked for a year, he designed and supervised the water system, including a large standpipe between Gardner and Westminster. From there he went to Hartford, Conn., on the construction of the Neponset Water Supply System. Here Jim was "Office Engineer" which meant he was out of the office most of the time, establishing stream gauging stations, grouting rock foundations under dams, testing sands, gravels, cement for concrete and later, for filters, testing water meters, hydrants, service pipes, water distribution and transmission mains, and reporting on all sorts of special investigations and "I sure did learn the whole works under a tough task master." By this time, he had a family of two boys, Richard and John, and a red haired daughter called "Mike," and he

decided to go to New Jersey and work on a large water project for Newark and seven other cities. This first project was completed in 1930. A "second" project is still going after 36 years and as Jim writes "is one of the reasons I am not retired but busier than I've been for many years trying to make water available to Newark in this, the worst drought of many that we have had since 1947." Jim came from Winthrop, Mass. Early in life he became acquainted with Prof. Allan R. Cullimore, I, of our Class, and they had much in common during their school years, college, and business life. (Allan passed away in 1956.) Jim enjoyed the mountains in winter for skiing and the seashore in the summer. He now has eight grandchildren and only recently taught two of them the fundamentals of skiing. Except for a slight hearing impairment in one ear, which is his only physical defect, Jim is a very active and hard working octogenarian.—Philip B. Walker, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass.; Gardner S. Gould, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

'08

The following letter from Harold Dodge, Secretary of 1916, will be of interest: "I noted your call for news in the January issue, and have an item about an '08 man that I was planning to put in my '16 column, but have decided to send it to you for your column instead. I have a letter from Emory Kemp, '16, in which he tells of a dinner and meeting of the Alumni Club of S. West Florida in Sarasota on December 13. In his letter Mr. Kemp notes: 'One of the attendants at the meeting from the Class of 1908 you probably know—Joe Wattles, Treasurer of the Class. He is certainly a young looking man. Before I knew who he and his wife were I thought he was from around 1917 to 1920. A very lovely couple.'"

We are sorry to report the death of Stiles O. Clements of Beverly Hills, Calif., on January 15, 1966.—H. L. Carter, Secretary, 14 Roslyn Road, Waban 68, Mass.; Joseph W. Wattles, Treasurer, 26 Bullard Road, Weston 93, Mass.

'09

We have received the following message from Art Shaw, who with Betty is now in Sarasota, Fla. "I am enclosing a clipping from the St. Petersburg Times regarding the death of Charlie Belden, II. He was well known down this way for his remarkable photography and his innovations such as the transportation of wild antelopes by airplane. You may recall his articles and pictures in the National Geographic Magazine. A few years ago we called on Charlie at his lovely home on Redington Beach but we have not seen him recently. I fear we get a bit lazy and reluctant to venture far from the attrac-

tive spot here. Today (February 2) it is sunny and warm again after a few coolish days including one night with frost."

The clipping states that Charlie passed away Tuesday, February 1, at North Redington Beach at the age of 78. He is survived by his wife, Mrs. Verna Belden; two daughters, Mrs. Marge Todd and Mrs. Annice Somers; and a sister, Mrs. Sidney Ford. Charlie prepared for the Institute at Cutler School, New York. While at the Institute he was most active, being a member of Osiris; the Mechanical Engineering Society, Walker Club; Technique Electoral Committee; and the Institute Committee. In earlier class notes we have told also of his experience in training animals, which characteristic undoubtedly developed from the few years he spent at Z Ranch in Pitchfork, Wyoming.—Chester L. Dawes, Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; George E. Wallis, Assistant Secretary, Wenham, Mass.

'10

Frank F. Bell writes: "Normally, I do not like write-ups as generally one is misquoted and made ridiculous, so I generally say 'no comment.' This editor came to my office—snapped a 'photo' and got my biography and came up with an unusually decent article. I submitted in order to get in the plug for Washington Crossing Foundation—a pet of mine. I enjoyed being at our reunion and seeing many of our classmates, but the 'ranks are thinning' and I noticed quite a difference between the 1960 and 1965 turnout."

The following article appeared in the December 1965 issue of Engineering Construction as a cover story: "Brig. Gen. Frank F. Bell II, AUS (Ret.) lives three lives in one. He demonstrates what achievements are possible for an individual in military, business and civic careers all rolled into one.

"Bell is president of Uvalde Construction Company, Inc. of Dallas, one of the oldest construction firms in the state. He is active in Dallas civic and social life, and has a military record spanning two world wars.

"Philadelphia, Pa., was Bell's birthplace, in 1888. His family soon moved to Bristol, and Bell's education was completed in the east, at Wm. Penn Charter School, New York Military Academy, Swarthmore Preparatory School, and Massachusetts Institute of Technology, where he graduated in 1910.

"After graduation, he began four years of globe-hopping as an engineer on various construction projects in Oregon, California, Hawaii, Straits and the Middle East. He returned to Philadelphia to serve as president of Simplex Vacuum Bottle Company until the beginning of World War I. He resigned his presidency and entered the U.S. Army Air Corps in 1917.

"Bell was commissioned a first lieutenant in the Aviation Section of the Signal Corps, became a pilot, and was promoted to captain before he was honorably dis-

charged in 1919. He became Chief of Allotment and Allowance Division of the Bureau of War Risk Insurance in Washington, but soon left for Texas to join the Henry D. Lindsley Oil Syndicate as an engineer. In 1921, he became associated with Uvalde Construction Company, and was elected a vice-president in 1923.

"That same year, at the request of the Federal government, he went into the Army Reserve as a captain in the Corps of Engineers, serving two weeks active duty per year. He later transferred to Army Anti-Aircraft Artillery, and had become a lieutenant colonel by 1938.

"Along came World War II, and Bell was again ordered to active duty. He activated and trained two regiments of engineers, and took one of them to England, where he was promoted to colonel. Commanding various units attached to his regiment, he served in the Battle of Brest, Battle of LeHavre, Battle of the Ardennes, and other campaigns in Northern France, the Rhineland and Central Europe, earning three battle stars, a regimental citation, the Legion of Merit, a Bronze Star, and the usual service medals.

"Bell was inactivated with his regiment in 1945 as a colonel in the reserve, and was promoted to brigadier general in 1948, at which rank he is now retired.

"He was elected president and vice chairman of the board of Uvalde Construction in 1953. During his association with Uvalde, the company has done an estimated \$18½ million in work for the City of Dallas, \$5 million for Dallas County, and \$32½ million for the Texas Highway Department, plus many other projects for governmental agencies and private concerns. The company now does over \$10 million annual volume.

"In civic and professional matters, he is a vice-chairman of the Dallas City-County Civil Defense and Disaster Commission. He was chairman of the Dallas Chamber of Commerce military affairs committee in 1958, was a national director of the Society of American Military Engineers for nine years, and is a member of the American Society of Civil Engineers.

"One of Bell's favorite civic projects is a patriotic endeavor to convey to school children some of the traditions and historical facts about the United States. He is a trustee of the Washington Crossing Foundation, an organization dedicated to the development of a shrine on the spot where General George Washington crossed the Delaware River on Christmas, 1776, turning the tide of the Revolutionary War.

"The foundation raised money to build an auditorium on the banks of the Delaware, where school children visiting the area can hear a short address, pledge allegiance to the flag, sing the National Anthem, and view the original painting of Washington and his men pushing across the river.

"He belongs to the Military Order of World Wars, Sons of the American Revolution, and the Order of Daedalians, a society of World War I officers who were airplane pilots before November 11, 1918. He is a 32nd degree Mason and Shriner and a member of Sigma Alpha Epsilon fraternity. He is a member of the Dallas

Country Club, Dallas Athletic Club, Dallas Technical Club, and the Idlewild Club, a social organization which annually brings out the Dallas debutantes.

"Nimble and active at 77, his hobbies are athletic sports, particularly ice skating and swimming. He is, in fact, a member of the Dallas Figure Skating Club, and was once squash rackets champion of the Dallas Athletic Club.

"Bell and his wife, the former Ione Sharpe of Carrollton, Ga., have two sons, Frank F. Bell III, of Raymondville, Texas, and Edwin S. Bell of Dallas, and five grandchildren."

Harold Lockett writes: "Right now I am looking out at a truly beautiful scene which should be in Maine or somewhere north—not in the Sunny South (Arizona), where I thought I had moved. A blizzard which hit about Saturday noon is trying to wear itself out. The snow has stopped but the wind is still howling and the snow drifting. This is where my several operations show up. Our drive, from our garage to the highway is about 50 feet long and has some 30 inches of snow. I'm not supposed to even think of a snow shovel and help is hard to get. It may be several days before this letter gets to the Post Office. We were about to take off for Florida next week when the reports of cold weather began to reach us, so postponed the trip until prospects of warm weather seem better."

Achilles Hadji-savva of Greece writes: "Received your letter of January 10th. My wife and myself were extremely pleased with your so very good news regarding your marriage. We are now sure that you both will be no more feeling lonesome. With our warm congratulations we wish you both a long and happy life. As regards your visit to Athens, you must not say that this may happen someday. It must and shall happen this year—early in summer."—Herbert S. Cleverdon, Secretary, 120 Tremont Street, Boston, Massachusetts.

'11

Paul and Ottillie Cushman are a remarkable couple to do in one year all the things that are set forth in their annual letter. After a bit of bragging about the accomplishments of Oklahoma that might well have come from the Chamber of Commerce, they say Paul is putting in about 48 hours a week with the Bearing Company and in addition is acting as "accident analyst" for death and serious accident cases where insurance is involved. Paul is governor of the Oklahoma Society of Mayflower Descendants and attended a number of meetings in this capacity. He also continued his Masonic degree team work during the year. Paul and Ottillie took part in square dance activities in Oklahoma City's Seventy Fifth Anniversary; and in the 14th National Square Dance Association Convention in Dallas, Texas, which was attended by over 11,000. Following the Convention the Cushmans and 119 others took a 3600 mile tour through Mexico. They attended the an-

nual Southwestern Unitarian Conference in San Antonio, having been active in the Unitarian Church for many years. They took part in a 21 bus foliage tour through the south western part of the state.

I am sorry to report the death of Paul Kellogg in Montreal on January 10. He was born October 10, 1888, in Buffalo, N.Y., and attended public schools there before coming to M.I.T. Paul is survived by his second wife and a son and daughter by his first wife. Since 1952 he has been chairman of Stevenson & Kellogg, Ltd. He was also director of Laurentide Equipment Ltd. and president of Integrated Manufacturing Company. Paul was with Larkin Company, Buffalo, as buyer from 1911 to 1920; United Drug Company, Boston and New York, 1920 to 1922; President and General Manager of Niagara Tablet Company, Niagara Falls 1922 to 1923; Factory Manager of Kalamazoo Stationary Co., Kalamazoo, Mich., 1923 to 1928; Assistant to Manager H. B. Sherman Manufacturing Company, Battle Creek, Mich., 1928 to 1930; Member research staff National Industrial Conference Board, New York 1930 to 1932; Member Senior staff Stevenson, Jordan & Harrison, Inc., New York 1932 to 1935. Paul moved to Canada in 1936 and was naturalized in 1941. He has been a member of Society of Industrial and Cost accountants of Quebec, Corporation of Professional Engineers of Quebec, Society for the Advancement of Management and Engineering Institute of Canada.

From early returns of prospect for attendance to the Reunion cards, it appears that some of us are getting old. Mrs. C. R. Strong says her husband has been suffering from tuberculosis for two years and now from senility. . . . William C. Davis, Jr., writes that his heart condition will keep him away from the Reunion. . . . A letter from Harry Tisdale says his wife's chronic illness will keep them in Florida. . . . Samuel L. Hayes who spent his business life in textile sales and technical work in dye stuffs retired in 1958 and now spends part of his time with his son-in-law. . . . Joseph Gershberg's heart will keep him in California where he retired in 1957. Ending on a more cheerful note, O. W. Stewart is home from the third serious operation in three months, is doing well and plans to be at the Reunion.—Oberlin S. Clark, Secretary, 50 Leonard Rd., No. Weymouth, Mass.

'12

A letter from John M. Hargrave, Box 857, Thomasville, Ga. 31792, tells of his retirement after running a tool business for 42 years. His greatest pride is that they never had a union until after the sale. There have been two unions since and plenty of labor trouble. John bought a plantation in South Georgia and started to operate on a large scale for about five years when he decided that he could not work with the farm mechanics who always reached for a hammer when a machine did not run to suit them. They sold the farm and moved into Thomasville

where they live opposite the golf course. They have a cottage on Walloon Lake, Mich., where they spend their summers.

John Selfridge of 1922 Jackson Street, San Francisco, breaks a long silence and tells about his activities since graduation. While he started with us he was ill and missed his junior year, graduating in 1913 as did his brother who passed away in 1956 from a heart attack. After graduation John worked for General Electric, Utah Power and Light Company, and Utah Copper Company before going to Edgewood Arsenal where he served as captain during World War I. His family consists of two boys and a girl, with 10 grandchildren. He was connected with the Industrial Department of the Fireman's Fund Insurance Company, finishing up as financial secretary and treasurer before his retirement. He hopes to get back East for our next reunion as his wife went to Dana Hall and afterwards studied music with Arthur Foote, living at the Stewart Club in Boston.

Be sure to see the recently released movie "The Sands of Kalahari" as this is based on the novel written by William Mulvihill, son-in-law of **Gene Marceau**. William is a science teacher at Glen Cove, L.I., and as I mentioned recently received the \$10,000 Putnam award for his novel of the same name. Glen Cove recently celebrated William Mulvihill Day when the play opened there. Gene is still in St. Petersburg and would be glad to see anyone traveling in that vicinity.

Jim Cook suffered a severe accident the night before Christmas crossing the street in Marblehead to meet his daughter and son-in-law. He was knocked down by a speeding car which broke both bones in his right leg throwing him up against the windshield with force enough to shatter the glass. Fortunately, his family was near at hand and took him to the Salem Hospital where he was cared for until he could be moved to the Mary A. Alley Hospital in Marblehead where he will be until the first of March. He is doing well but would certainly appreciate a word from any of his old classmates.—**Frederick J. Shepard, Jr.**, Secretary, 31 Chestnut Street, Boston 9, Mass.; **John Noyes**, Assistant Secretary, 3326 Shorecrest Drive, Dallas 36, Texas.

'14

Course VI Fourteeners in particular will have reason to recall **Carl A. Sanborn** whom we have learned died on August 31, 1965. His home was 10715 Grovedale Dr., Whittier, Calif. He spent most of his professional life in the consulting business in Los Angeles, first as a member of Homes & Sanborn and later C. A. Sanborn & Company, Ltd. In recent years he lived in South Pasadena and then Whittier. The records show that he married Rita Maure Potts in 1917 and that they had one child, a girl. The sympathies of the class go out to Mrs. Sanborn. . . . We must also note the death in recent months of one of our class who was actually with

us only during freshman and sophomore years and who later went elsewhere to acquire a medical education, **Dr. William R. Thompson**, Course II. He practiced for many years at 9 Central St., Lowell, Mass. Our records contain no further information.

We are delighted to welcome to our Fourteen Staff as Class Estate Secretary, **Skip (Elmer E.) Dawson**, whom you will undoubtedly be hearing from, if you have not already. Some of you already have made commitments so that some part of your estate, after it has served your wife or other near relative, may go to M.I.T. for general or specific needs as you may choose. We know of one recent such estate commitment by a Fourteen in the amount of \$100,000. Any amount is, of course, welcome. Many such estate commitments have been for scholarships. In this connection it might be noted that the tuition has just been raised to \$1900; but we are told it is hoped that any individual who can qualify scholastically to enter is certain to be taken care of financially, up to the limit of his legitimate need by the various scholarship and loan funds which are now available. There are, of course, a few part time jobs which are also available. We are especially interested in the need for scholarship help, because we are still acting on the Educational Council, to interview applicants for admission in a certain area in Maine. We do not see a large number of such applicants each year, nor do they on the whole succeed in scholastically making the grade, but every now and then there appears an unusually well qualified individual who can only afford to go to M.I.T. if rather liberal scholarship help is available.

A few contacts, . . . a note from Rich telling us about an interesting Alumni Council meeting which we missed due to a snowbound airport. Yes, we've had a little of the white powder here in Maine but we judge that some of the areas farther south have had as much or more. . . . Also a phone chat with **Lin Faunce** in Connecticut who told a little of a recent short sojourn in Florida. He tried to contact Charlie Fiske but was told that Charlie was "vacationing." Later Lin dropped me a note revealing some of his nefarious doings in recent months. To quote: "We have been active in First Congregations Church in Bloomfield (membership 1143) for the past eight years. I was elected a deacon recently without having to give up my 5:00 p.m. martinis or my snappy stories. I have been Maintenance Committee Chairman for seven years and the minister told me the other day they were thinking of changing the title to General Manager because I handle everything but the preaching. The Township Committee is trying to stir up interest in a \$1,500,000 Redevelopment Project so as to get some federal tax money back. I'm on a committee to establish a Housing for senior citizens to be sponsored by the churches. With seven grandchildren within eight miles from here to keep in touch with and a little woodworking on furniture reproductions I am keeping out of mischief. Best regards and Happy New Year to you both from both of us."

I suppose it is not surprising that in our relaxing years, being what we are, some of our talents are directed to church work, at least the physical aspects of it. P.S. Some of you other Fourteeners, drop us a note and tell us what you are doing—and don't forget Alumni Day.—**Herman A. Affel**, Secretary, Rome, Maine. Mail: RFD 2, Oakland, Maine.

'15

The Class Supreme—19 classmates proved this again at a Class dinner at the Chemists' Club in New York on January 28. **Larry Landers** and **Bur Swain** again set this up and deserved and received a resounding hand of applause for their work and interest in making this such a successful and enjoyable class evening. After a cocktail hour, the Pirate, famous from Summer Camp days, opened the evening with a nostalgic and rousing "We are Happy." Bur and Larry outdid themselves proud with the delicious dinner we all enjoyed. Present were **Dick Bailey** (Philadelphia), **Jerry Coldwell**, **Alton Cook**, **Alan Dana**, **Ralph Hart**, **Joe Livermore**, **Ben Neil**, **Gil Peakes**, **Speed Williams**, **Larry Quirk**, **Bur Swain** and **Ray Walcott**. From Boston, **Larry Bailey**, **Larry Landers**, **Azel Mack**, **Archie Morrison**, **Frank Murphy**, **Bill Smith** and the swash-buckling Pirate brandishing his boarding cutlass and pistol. The Connecticut contingent of **Alan Dana** and **Larry Quirk** gave **Ben Neal** from Lockport some competition for long distance honors. At dinner we showed the colored slides of our 50th and they were enthusiastically received. These are available to any one who wants to show the slides at home. After dinner more than half the crowd adjourned to our comfortable headquarters room upstairs for an evening of nostalgia. No singing this year, but **Dick Bailey**, despite all the hissing and booing we gave him, entertained us with his stories. It was a pleasant, relaxing and friendly evening, typical of the wonderful spirit of closeness and camaraderie that makes our Class tick to deserve that name, "The Class Supreme"—Long may it wave! Several regular attendees were absent. Mostly due to illness or Florida. They sent regards to the crowd but we missed them: **Phil Alger**, **Herb Anderson**, **Wayne Bradley**, **Whit Brown**, **Sam Berke**, **Henry Daley** and **Sol Schneider**. **Otto Hilbert** sailed that day for a cruise and **Jim Tobey** was suffering at West Palm—ah, me!

In January our good old friend **Wally Pike**, was in a Cambridge Hospital for surgery. He was greatly cheered and helped to a quick and complete recovery by the many warm, friendly cards and letters you Classmates sent him. Wally is now back in circulation. He certainly was overwhelmed with such spirit and sends many thanks to you all. . . . The Editors of "The Review" sent each of us Class Secretaries a Christmas gift of **H. W. Fowler's** "A Dictionary of Modern English Usage." A nice gift, which I am glad to have and to use. . . . Before leaving for the winter in Tuscon, Virginia and

Hank Marion phoned from Plainfield, N.J., to check on Wally and bid us goodbye. It certainly was thoughtful of them to do that and we were glad to talk with them. . . . At the official luncheon of TAPPI in New York, on February 23, **Allen Abrams** was presented the TAPPI Medal. Quoting from their news release, "The Medal is the highest honor of the Technical Association of the Pulp and Paper Industry (TAPPI) and is presented for achievements which have contributed to the technical progress of the pulp, paper, and paperboard industry. Thirty-three individuals have received Medals since they were first conferred in 1928. Through his leadership in the packaging field, his life-long participation in civic affairs on a national level, and his 40 years of service to TAPPI, culminating in election to its Presidency for 1932-33, Dr. Abrams has become one of the best-known figures in the pulp and paper industry. Dr. Abrams graduated from Washington & Jefferson College in 1910, and received a B.S. degree from M.I.T. in 1915. Washington & Jefferson honored him with a Doctor of Science degree in 1937. After graduation and a brief interlude as an instructor at M.I.T., he joined Bemis Brother Bag Company as the textile firm's first chemist. During World War I he served as an officer in chemical warfare service. Upon his return he became chief chemist at Cornell Wood Products Company, leaving to join the Marathon Corporation in Rothschild, Wis., as technical director. At Marathon he achieved a reputation as an innovator in folding cartons, overwraps, and flexible packaging. During World War II Dr. Abrams was a major in the chemical warfare service and deputy director of research and development of the Office of Strategic Services (OSS). He retired from Marathon in 1956 while vice-president and research director, but he lost no time in beginning another career, and became a consultant to Arthur D. Little, Inc. Dr. Abrams joined TAPPI in 1924 when it had only 500 members, compared to today's 11,000, and was soon immersed in committee activities. He was the first chairman of the Training Committee, created in 1927 to provide an opportunity for teachers and students to work in the industry during the summer vacation. (Two decades later he organized a Business-Industry-Education Day in Wisconsin that is now an annual event and has been adopted nationwide by the Chamber of Commerce of the United States and the National Association of Manufacturers.) Dr. Abrams was elected president of TAPPI for a two-year term in 1932, but this did not end his active role in Association affairs. Only last year he was chairman of the committee which arranged the celebration of TAPPI's 50th Anniversary, and he was a guest speaker at the annual meeting. The new TAPPI Medalist has written a number of technical papers, many of them on the permeability of paper to liquids and vapors. His other publications deal with paper and board testing, chemicals from lignin, domestic and foreign trade, and the problems of technical control and research. He holds numerous patents, largely in the field of packaging materials, in-

cluding the transparent cellophane-type now widely used as a cheese wrapper. He has been active in many organizations besides TAPPI. He was president of the Industrial Research Institute, Inc., a group consisting largely of the research directors of major American corporations. He has served on the board of trustees of the National Council for Stream Improvement. As chairman of the research committee of the National Association of Manufacturers, he was instrumental in preparing a study on "Tomorrow's Scientists and Engineers." In 1956-57 he was a representative on the President's Committee on Scientists and Engineers, formed to stimulate the interest of young people in engineering and science. Among several awards, he was cited in 1947 by the Chicago Section of the American Chemical Society as 'One of the ten ablest U.S. industrial and engineering chemists.' Dr. Abrams lives with his wife in Wausau, Wis., where he has long been prominent in local affairs and still holds office in several civic groups. They have two married daughters." Congratulations Allen on this richly deserved award and outstanding high honor.

Phil Alger, collaborating with Dr. Ernest Caldecott of Schenectady, has recently published a book "Steimetz, The Philosopher," an impressive presentation of the views of this famous electrical wizard other than those on electrical engineering and mathematics. "His philosophy for living, his intense sympathy for human aspirations, and his specific ideas about industry, government, religion and education are most interesting and applicable to problems of the present day." This quote is from the introduction in the book which Phil kindly presented to me. . . . Now, here's a splendid letter from **Dick Bailey**, Philadelphia, just before the dinner in New York. We're all always glad to see Dick, who never fails to amuse us, aggravate us and keep us up late with his stories. And what stories! "You bet I will hold everything for Friday, January 28, 1966. I plan and hope to be there, to see and visit with those fine '15ers, especially you, Bur, Larry and Honorable Mr. Rooney. Your Class News Report in the December Technology Review had two descriptive factors that usually do not go together. Both Quality and Quantity. No one could conceive of a better Class Report than that one. That Fiftieth Reunion must have been 'out of this world.' You and your cooperative associates who planned and arranged the Class Reunion deserve all the fine congratulations you received. May I take this opportunity to congratulate you also, even if I did not participate. Could any M.I.T. class, or any other college or university have a better Class Secretary than the M.I.T. Class of 1915? NO. I look forward to seeing all you fine men just a month from now."

Anent the Biblical reference in last month's column about the birth of a Samson, our own Al writes "It might have escaped your attention that my Miele—Grandfather's name was Manoh (Judges XIII, verse 2). I have considered forming a club of upright, sanctimonious classmates to be known as the Manoh Club.

But, I hesitate as I fear certain classmates of low character would mispronounce it." What a guy! . . . On Friday, April 15, there will be a Boston Class dinner at the M.I.T. Faculty Club in Cambridge, where we hope to see a record-breaking attendance. In preparation for his annual Class Cocktail Party, on Alumni Day, June 13, at the M.I.T. Faculty Club, Al writes, "It's interesting to see how the slogan '1915 The Class Supreme' has caught on. It's a great rallying cry. The great success of 1915 is that we take a classmate as 'the guy we went to school with.' We want him and his always to feel welcome and an important part of the Class." Very well said, Al. So, bring you and yours to the Class Cocktail Party—all FREE!

Just before Christmas, **Ken Johnson** was laid up again in the hospital. He certainly has had a long, hard siege of sickness. Lots of good cheer for a quick recovery and some good health. . . . The Peterborough (N.H.) Transcript of January 20 carried an excellent picture of **Pop Wood** at the presentation of a radio base station and remote control unit to that town's Police Department. Pop deserves credit for his interest and contribution in local civic affairs. . . . In some correspondence with Joe Snyder, Treasurer of M.I.T., **Ben Neal** felt he might be fired now that he had turned in that magnificent 50th Fund gift. I take the liberty of quoting from Joe's December 21st answer to Ben, "Firing you after the wonderful job you did for the Class would be completely out of keeping, and I am delighted to have heard from you once again. It was a splendid performance you turned in for the Institute, and we are most grateful here. With all good wishes." Ben's fine job will live on for a long time. . . . **Andrew J. Stivers** died December 3, 1965, in Georgetown, Ohio. . . . I'll see some of you at the Boston Class dinner April 15 and then a lot of you with your families and guests at the Class Cocktail Party on Alumni Day June 13.—**Azel W. Mack**, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142.

'16

Just two months to go for the 50th Reunion in Cambridge and Cape Cod! How about that!! Ralph Fletcher, our still-ski-loving president, reiterates all he had to say in the March column—you really can't afford to miss the doings. As you can well imagine, Steve Brophy and his bubbling reunion committee are steadily but surely working out those many details for keeping things moving smoothly (a) on campus during registration and commencement on Thursday and Friday, June 9 and 10, and Alumni Day, June 13, as well as for (b) the whole two days at the Oyster Harbors Club in Osterville, from Friday afternoon until Sunday afternoon, June 10, 11, and 12.

Steve now tells us that Henry Shepard is to be chairman of the Cambridge Host committee during the campus doings. And

good old reliable Stew Rowlett, our tried-and-true registrar for the 45th at Oster-ville, will be registrar once more and will go all out to see to it that all are properly taken care of. These men and their committees will have their hands full, for the number of classmates and wives far exceeds that for any of our past reunions. The official picture of our 25th Reunion at the Oyster Harbors Club in 1941 shows 106, but that was stag. Our 45th with wives in 1961 at the same location had a total attendance of 93, if we have checked the figures correctly.

The Regional chairmen continue their activities.—Ralph Fletcher in New England; Jim Evans of Fair Lawn, N.J., in the Atlantic Coastal States plus Connecticut, Cy Guething of Birmingham, Mich., in the Midwest, Vert Young of Bogalusa in the South, and Irv McDaniel in the Southwest and West. Steve Brophy's letter in January went to all who have said they will be at the 50th and who have indicated 50-50 chances of attendance, and with this letter went a card asking for coat size and sleeve length for a cardinal blazer, complete with M.I.T. seal and Class numerals. Including information on costs, Steve's letter goes on to say: "Plans are rapidly taking shape; all committees report progress. Regional Chairmen are working on members from whom we have not heard, with the hope that we may persuade as many as possible to be with us. The Entertainment Committee, under the joint chairmanship of Irv McDaniel and Jim Evans, promises a bang-up time for both classmates and wives at the Oyster Harbors Club. Leonard Stone and Harold Dodge have practically finished the Reunion Souvenir Book and Walt Binger, our Class Historian, reports a gratifying response to his request for vital statistics. The Institute, as you know, is providing accommodations for us in Cambridge—both for Commencement and Alumni Days."

At a meeting early in February, Peb Stone brought in for inspection and approval the mock-up of the souvenir directory that he has handled pretty much alone, with a little help from your secretary and special help from Azel Mack, '15. Peb called particular attention to a very sparkling feature of the directory, little illustrative corner sketches by Chick Kane, '24, in Chick's own unique style, a style that is recognizable by practically every M.I.T. man since who knows when, and has been especially admired by the writer for a long, long time. We'll be proud of this feature, says the whole reunion committee. Walt Binger, with the results of his historical questionnaire under study, is currently getting more and more surprised at how much so many can write in so few lines.

From all across the country and even over the borders, nice responses are being received, as a few samples will show. From Maury Holland, in Port Charlotte, Fla., normally from East Greenwich, R.I.: "I'm dreaming of that rare day in June when I put on my cardinal jacket and hop around M.I.T. like a robin with cap and gown." He hopes to see his old boss, of the National Research Council, Van Bush. . . . Kem Dean writes from Hous-

ton: "Looking forward to seeing you and the others in June." . . . Bert Ellis writes from Cleveland: "I am pleased to state that my wife will also be able to attend this big event with me." This will be her first '16 reunion, and there are many other distaff-side firsts this year. . . . Will Wylde, thinking of the 50th while down in Anna Maria, an island off the West Coast of Florida, says he has written to Earle Pitman in Maine, wishes he had brought his '16 Geographic Register, and asks for Col. Walter Wolfe's address in Bradenton, as well as Val Gooding's address in Clearwater (this is the Atlantic Coast Regional Committee at work under Jim Evans). . . . Dave Patten in South Duxbury notes: "Have written Don Garita in Mexico City to be on deck in June." . . . John Gore writes from Canajoharie: "Good looking 50th Reunion stationery! As for 'going,' I guess the 50th is our next goal! We are looking forward to this event with much pleasure—the graduation, the reunion on the Cape, and the Alumni banquet. You-all have a wonderful program lined up." . . . And with Raef Alfaro-Moran of San Salvador, El Salvador, C.A., attendance in June continues to be an increasing possibility. . . . Finally, Cy Guething, writing from Harbour Island, Bahamas, has some forward-looking words: "So here we are back at our winter lone spot for the 8th or 9th year and really love it as there are so many old age pleasures. We only lack a full golf course. Ours is but two holes and be-

50th Reunion

comes available only at low tide. It does not remind me of Oyster Harbors Club."

It scares us just to look at the skirruns on the post cards Ralph Fletcher sends us from Switzerland every January or so. This year's card shows some pretty wicked ski-marks at Davos-Aufnahme. "Great skiing" says he. "Have had 20 days of sun and marvelous snow." And in the distant background who or what do you think are the peaked ones looking over the scene? None other than Scesaplana, Drusenfluh, and Sulzfluh!! Pretty rugged company for our Mr. and Mrs. President! (One must get out one's atlas to locate such high spots, mustn't one?)

From Bill and Helen Leach in Austin, Texas, come words of praise for the complete set of Sylvia (Mrs. Vertrees) Young's Second Safari Letters which we have had on loan. Helen explains that she kept them much too long "but did want certain people to read them. They should be published!!" That's what we all have said of Sylvia's remarkable writings. And we have been hopefully waiting for word from Vertrees that Sylvia's eyes have shown improvement.

In this letter from Harbour Island Cy Guething had some thoughts, some rambling, some not: "Am just all filled up—my soul, from church this a.m., and my stomach now looks like Jim Evans' after a Bahamian dinner. Hurricane 'Betsie' which hovered over here for two days denuded the trees of all foliage and many limbs, but the house damage was very

small compared to that of the New England blow around 1937. The farmers here who have gardens on Eleuthera got hurt the most as they are losing the banana and citrus fruit crops for a whole year. The fishing seems to be just the same and that is pleasing to us. The beaches have changed, if at all, for the better. And most of all the natives are the same wonderful people. Although the black population is only about 1000, it is rapidly increasing with families of 16, 18 and 20 children by the same mother. But the younger generation are cutting down to 6 or 8. They say that they are smarter than their parents in that they learned the cause of child-birth much sooner."

If you would like to have well-documented reminders of all the little old things we have been through in this life of ours, then what you need is just a little time and your nose poked into a certain book, written by a well-known Sixteener, "Four Turbulent Decades" by Wesley Blank, published by Vantage Press, New York. It starts with the Roaring 20's, goes through the depression, covers the exploits of daring aviation pioneers, treats World War II, Korea, the atomic, hydrogen and neutron bombs, space problems—really a remarkable account of the amazing four decades from 1920 to 1960. We trust Wesley will have a copy at the Reunion.

Herb Mendelson, who worked and worked successfully a year ago as Chairman of the Emergency Committee to Stop the 64th Street Subway, says it looks as though he might be drawn into another. This time he may be involved "in endeavoring to halt New York City from starting construction on a subway tunnel from Queens to Manhattan, with no idea what connections are to be made at each end, no idea what the cost of the connections will be, no idea how it will be financed, and no idea how it will tie in with the proposed mass transportation plans now being formulated. What a mess! As for our proposed travels to get away from it all, we are toying with the idea of visiting the land of the Queen of Sheba, namely Ethiopia. Understand she is not available for a conference at present. Tough luck, eh? Can't say that we are not trying." . . . Maury Holland's report from Florida mentions that he and his wife are down there for the fifth winter, that it is warm and dull "but Marion's doctor ordered her down with: 'No golf, no bathing, no housework.' I'm maid of all work, bucking for a Ph.D. in Home Economics." . . . In mid-January Francis Stern reported they were having fine 70-75 degree weather in Palm Springs. He was just then taking a quickeer trip back to New York to attend a Junior Achievement Executive Committee meeting, plus a session of program evaluation. We believe he is still chairman of the Eastern Regional Board of Junior Achievement.

Dr. Val Ellicott, long a director of the State Department of Health in Maryland, reports from Baltimore that he is enjoying retirement—the busiest time of life. Says: "Florida for the month of February. Lots of things regarding our church and serving on committees of voluntary agencies, God bless them!" . . . Speak-

ing of medicine, we have a note from **Coke Flannagan** in Inverness, Fla., saying: "My main activity for the last several years has been trying to keep our local hospital running on an even keel. But after nearly seven years as Chairman of the Board I decided I'd done enough damage so resigned to take up my normal occupation of 'puttering.' In that activity I can really shine." . . . And our own **Dr. Paul Duff** of Peabody says his note has to be mostly about the family: "Our youngest is a Marine and the 7th boy is in the Service. He was 'Captain's Joice' at Villanova and promoted to the Regular Service (NROTC)."

Earl Townsend of Newtonville is now fully retired and finds that his family of four children, six grandchildren and one great grandchild take up most of his interest. After M.I.T. Earl spent five years with the Massachusetts Highway Commission on the design and construction of state highways. The next 21 years were with the National Appraisal Company of Boston compiling valuations for use in fire insurance, cost accounting, mergers, and security issues. He says: "Then, 20 years with the Factory Mutual Engineering Division of Boston and Norwood in their Appraisal Department. The work carried me into all of the 48 states, most of the Provinces of Canada, Puerto Rico, Mexico and Cuba so it has been good employment for one who likes travel."

Will Wyde of Stamford, Vt., just over the Massachusetts line, expressed special interest in the picture of last year's reunion because **Bill Leach** was in it. Says Will: "He looks as happy as he always did back in our school days. Seeing his picture reminded me that he and I were the only members of our class to accept Dr. Walker's call to join the faculty of his newly formed School of Engineering Practice in the fall of 1916, he going to the station in Niagara Falls and I going to the one in Bangor, Maine. After a one-year term as instructor there and one year or so touring France as a guest of the U.S. Army, I returned to Bangor to join the research staff of the paper mill there which hosted the School, thus getting into the paper business in which I continued until retirement in 1959."

Elizabeth Pattee, retired Professor of Landscape Architecture of the Rhode Island School of Design, has a problem—the fact that the Reunion time just conflicts with the meetings of the International Federation of Landscape Architects in Stuttgart, Germany. Having settled in Meadow Lakes Village of Hightstown, N.J., she has been doing some lectures for the National Council of Garden Clubs, New Jersey Branch.

Dan Comiskey says that last year, the first one of retirement, was spent tying up many loose ends, so that he can now relax, even do nothing for a few months or even years ahead. "When one is busy, many personal projects are set aside until 'next year' which somehow never seems less busy. With good health we hope to revisit the Southwest and the West Coast this spring." . . . **Dave Patten**, speaking in what we consider to be normal grandparental terms, noted in January: "If we are in residence at the old homestead in

Duxbury, we usually go to the farm in South Dartmouth for Christmas with a horde of grandchildren: recovery takes about three weeks." . . . **Duke Wellington** offers a thought: "They say that when one retires life hangs heavy. That is the understatement of the year. The summer is full taking care of my two places in Maine. The winter we spend in Florida—in between it is this and that. Our apartment in White Plains is too small to entertain the various members of our families so we have to visit five of them. Cannot go to one without seeing the others. By the time you get this (late January) I will probably have seen **Stew Rowlett**—he will be the only classmate I have seen in a year."

Jack Burbank, in planning board activities on the Cape, finds himself up to his ears in problems of "off-street parking, village business zoning, motel zoning restrictions, modification of the Building Code, etc. It is all most interesting—so many opinions on minor points to be resolved."

We have had word from **Raymond Blakney** of Claremont, Calif. Raymond is a retired Congregational minister, and a past president of two colleges—Orlinda Childs Pierce College in Athens, Greece, and Olivet College in Olivet, Mich. His reply to our questionnaire goes like this: "Doing: Presently trying to turn the Book of Exodus into an epic. Going: July-October '66, Sedona, Arizona; October-November, Nova Scotia. These in lieu of going to Salisbury, Rhodesia where my son is at work (missionary). Seen: Many, many! but of M.I.T. only my friend and neighbor the Reverend Williston Wirt '21. Philosophy: If my memory still serves, we used to have final examinations at the 'stute. Retirement is just that. What can you turn in without your books, credentials, status, titles, honors? This is what makes retirement exciting." We happen to know that one can find much of what Raymond has been doing over the past 50 years by looking in Who's Who, 1951-1962. He notes: "I'm most proud to be an M.I.T. alum even if I wasn't much of a student in the good old days."

And in like manner, **George Petit** sends his answers to the routine questionnaire: "Doing: Computing and graphing (by my own trend-analysis method) the elements of the general U.S. economy for my 'Review for General Construction Contractors' in an endeavor to determine the termination (major turning point) of the current five-year boom. Also preparing analytical plan for the 1966 Major Baseball season for the benefit of the Chicago White Sox (done since 1959). Going: Have been at my den desk. Seen: No one, but received a beautiful letter from the White House signed 'Lady Bird Johnson' for a suggestion as to an extremely economical method of removing the countryside blight of automobile wreck piles. Philosophy: For Nineteen Sixteeners to continue to render service to civilization until only death can halt their supreme contributions."

We regret to report the death of **Walter S. Stewart** of Providence after a long illness, on October 23, 1965, of **Robert F. Hart** of Westfield, N. J. on December 14,

1965, and of **James L. Weaver** of Newport, R. I. on December 17, 1965. We also regret receiving word of the death of **L'Roche G. Bousquet** of Clearwater, Fla., on January 19, 1966. Only last April we reported on LGB's enthusiasm as he and his wife had just settled in their new home in Greenbriar, a retirement community in Clearwater. At this writing we do not have further details but will include additional information as it is received.

We must express our many thanks for the more than 39 birthday cards and letters received back in January—pretty overwhelming; and instigated we believe by **Jim Evans**, **Vertrees Young** and others. Some of the messages provided a considerable degree of merriment—perhaps too good to keep under cover, as for example: "Here's a birthday bottle" (a 2-inch red rubber hot water bottle), "to give you a nice warm glow. . . . All you have to do is fill it with hot H₂O;" "Do y'all know why li'l ole me is sending this li'l ole card to li'l ole you? 'Cause y'all are a li'l older;" "Hope you live to a ripe old age, and another year should do it;" and "You don't have to paint the town and raise Cain to try to forget you're a year older. . . . but it helps!" And included was a nice card from the jovial Assistant Secretary of '17, **Dix Proctor**. John Fairfield quoted famous authors: "'Just as I approve of a young man in whom there is a touch of age, so I approve of the old man in whom there is some flavor of youth.' Cicero: De Senectute. 'Old wood to burn, old wine to drink, old friends to trust, old authors to read.' Francis Bacon." And **Bill Drummey**: "I can think of nothing better than to wish: 'May you live as long as you want, and never want as long as you live.'" Plus a bit from the **Vertrees Youngs**: "Hope you will have many, many more—or as many as you want. Or, as the Bible hath it: 'As thy years, so may thy strength be!'"

The February New York Class luncheon was well attended, with discussions of plans for the 50th. Those attending included **Ralph Fletcher**, who flew down all the way from good old New Hampshire with his aides—**Bob O'Brien** (honorary member and 50th Reunion Secretary) and **Donn Byrne** (new RAF Secretary)—**Joe Barker**, **Walt Binger**, **Steve Brophy**, **Harold Dodge**, **Jimmy Evans**, **Mac McCarthy**, **Ken Richmond**, and **Peb Stone**. These luncheons are held at the Chemists' Club, 52 East 41 Street, the Thursday following the first Monday of each month; the next one is April 7. . . . We have further letters to be reported in the next issue—from **John Gore**, of Canajoharie, from **Howard Claussen** who has just officially made the grade of "Navigator," and **Milton Schur**, who continues active as Vice-president, Research and Development, Packaging Division, **Olin Mathieson**. And so we close the column for the present with a word of appreciation to those who answer the call for a paragraph or two, or a bit of philosophy. Do come to the 50th; write a little but write often to any of your Class officers. —**Harold F. Dodge**, Secretary, 96 Briarcliff Rd., Mountain Lakes, N.J.; **Ralph A. Fletcher**, President, Box 71, West Chelms-

ford, Mass.; **Joseph W. Barker**, Vice-president, 45 Beechmont Dr., New Rochelle, N.Y.; **Hovey T. Freeman**, Treasurer, 45 Hazard Ave., Providence, R.I.; **T. D'Arcy (Steve) Brophy**, Reunion Chairman, 470 Park Ave., New York, N.Y.

'17

All good things come to an end. The secretarial ball has bounced back from Assistant Secretary **Dix Procter** to your Secretary because Dix is getting ready to sail down the west coast of Africa on the **Freighter African Moon** on a two month's cruise. They were due to sail during late January but sailing was postponed until the middle of February. . . . The Tech Club of New York (not the N.Y. M.I.T. Center group) had its initial cocktail party of the year on January 18. Dix and wife along with **Dick Loengard** represented '17. About 40 were present; half remained for dinner at the Chemists' Club. Dix estimates that if the drinks were on the house, the number might have been doubled. On January 27 Dix and wife and **Bert Morton** represented 1917 at the New York M.I.T. Center dinner, which was declared to be an excellent affair, with about 125 present. The N.Y. 1917'ers would like to see the M.I.T. Center and the N.Y. M.I.T. Club get together and hold one of the old dinners that used to fill the Biltmore ballroom.

The following article in the National Petroleum News of August 1965 relates to the activities of **John Harper** who was at M.I.T. from 1915 to 1917 and received a degree of S.B. in Electrical Engineering: "On a recent summer afternoon, in a pocket-sized office that overlooks the industrial section of the borough of Queens, a distinguished jobber statesman and organizer diffidently disclaimed having had much impact on the oil industry. On a wooden table in the corner of the office, tied together in six or seven piles, were 40 or 50 plaques, certificates of appreciation, distinguished-service awards, and commemorative medals and photographs all inscribed with one name: John Harper. . . . John Harper's modesty and lack of pretense are typical of the man regarded by many as the ranking jobber of the country, and honored as such. . . . After studying at Harvard, M.I.T. and Oxford, Harper began his oil-industry career in 1919 as a statistician in a Louisiana production office of Sinclair Corporation. He next joined an engineering firm that was building a refinery for New England Oil Refining Company at Fall River, Mass. When the job was done he joined the refining company. In 1927 he went with Tidewater Oil Company, first as a salesman, later as district manager. He later joined Richfield Oil Company as a district manager in Long Island City. In 1937 he became a Richfield distributor in the New York City area, switching brands when Richfield phased out of its metropolitan operations. He's now supplied by

Tidewater (gasoline) and Shell (fuel oil). John Harper's contributions to the industry in general and the jobbing segment in particular include active participation in the formation of two strong jobber groups (National Oil Jobbers Council and Empire State Petroleum Association); director of distribution and marketing with Petroleum Administration for War in District I; chairman of American Petroleum Institute's jobber-advisory committee, board of directors, and executive committee."

Frank E. McKone, now residing in Dover, N.H., with relatives, after the closing of his hotel in Canajoharie, N.Y., writes as follows: "Next August 1, I shall be 81 so you will see that I am not doing anything strenuous. I was a graduate student under Professor Peabody. I had been '08 at Dartmouth, but contracted undulant fever in 1905. I transferred to the University of N.H. at Durham to complete three years in electrical engineering. After cadet training with General Electric at Lynn, Mass., I returned to Durham as Assistant Professor of Mechanical Engineering. I left Durham five years later to get my Masters Degree in Aeronautical Engineering at M.I.T. under Alexander Klemin. War came, and I went with the U.S. Signal Corps. I resigned so that I might build a wind tunnel at the University of Washington in Seattle for William Boeing. . . . M.I.T. was a distinct pleasure after serving at Durham. My service with General Electric was the most pleasant. My most discouraging year was with the Larson Aircraft Company of Long Island. While there we put out the Dr. Junker all metal plane. . . . If I were doing things over again, I would have gone to M.I.T. in 1911 instead of falling for teaching. Even so, I enjoyed my work for William Boeing at the University of Washington. My grandson is a freshman at M.I.T."

Chandler T. White, retired Vice-president of General Aniline & Film Corporation writes, "Mrs. White and I spent last summer and autumn at our home in Greenwich, Conn., which we always enjoy, as it is such a complete change from our life in New York City. Our daughter and her family, which includes three daughters, were also with us for a greater part of the time, and add greatly to our pleasure. I have many activities, among them gardening, which I enjoy. . . . Early in November after we returned to New York, we took a cruise on the Queen Elizabeth, including stop-overs at Bermuda and Nassau. The cruise was ideal. We were fortunate in having excellent weather, especially nice on the days when we were ashore. . . . I am now endeavoring to reestablish my chemical consulting work which I was forced to give up due to a series of health difficulties."

Bob Erb and his wife are off on a travel spree. He writes, "Within a few days (early February) we go to San Francisco and then to Hawaii where we will spend three weeks on Maui and the big island of Hawaii. Then we'll go to Honolulu for a few days. After the past week of snow and cold weather in Connecticut, this plan looks mighty good. We'll then move from Honolulu to Seattle, Wash., to stay with former New Canaan, Conn., friends.

During June and July, we plan to make our first visit to Scandinavia. We will do a North Cape cruise and then visit Bergen, Oslo, Copenhagen, Stockholm, Helsinki and Paris. We have friends on the French Riviera at Cap Antibes, near Nice and will end our trip there. We will probably not get to our house on Governors Island at Lake Winnepesaukee until the middle of August. September and early October are beautiful in New Hampshire."

The deaths of three 17'ers are reported: **William D. Canan**, of Hagerstown, Md., on December 20, 1965; **William A. Clark** of Pittsford, N.Y., in September 1964, and **Harold F. Eastman**, of Stow, Mass., on December 12, 1965. William Canan was at the Institute during 1916 and 1917 obtaining an S.M. degree in Electrical Engineering. He prepared at Pennsylvania State College. The greater part of his business life was spent with the Rust Engineering Company, Pittsburgh, Pa., Engineers and Constructors. He was in his 79th year when he died. . . . **William A. Clark** received his S.B. degree at M.I.T. in Sanitary Engineering. He received his M.S. at the University of Rochester. He was a consulting engineer combined with teaching mechanical engineering subjects at the Rochester Institute of Technology. . . . **Harold F. Eastman** was at M.I.T. during 1915 and 1916 in Electrical Engineering. He received his S.B. degree at Harvard. His later years were occupied as a sales engineer for his own company in Boston, specializing in the sale of steam specialties.

The **Dennens** are off again southward on their way to the Fiesta of the Mexico City M.I.T. Club on March 10, 11, and 12. They put their auto on a United Fruit boat and sailed for Guatemala. . . . **Rene Pouchain** spent the Christmas holidays at Williamsburg. He was with several friends from Philadelphia who make this an annual pilgrimage. . . . **George R. Duryea**, President Cyclone Grate Bar Company of Buffalo, N.Y. informs us that his father, of automobile fame is still alive at 96. . . . **Tom Meloy** is retiring from Melpar. In recognition of his 20 years of service, his portrait in oils was hung beside that of Mr. Westinghouse in the company office. Tom is opening a private office in Washington, D.C., where he will keep an eye on his major business interests. His extra curricular activities include work with conservation, and he has been named by the Governor of Virginia to a committee concerned with conservation plans for the Old Dominion. . . . In another activity, the Codex Corporation of Watertown, Mass., recently announced Tom's election as a director of the corporation and chairman. . . . **Allison R. Williams** writes from his home in Vicksburg, Miss., that he is "in a most peculiar predicament," he has "nothing to do and yet don't have time to do it." . . . As of the present date (February 8) **Stan Dunning** and wife are departing from Boston cold for Naples, Florida, to remain there until the end of March. . . . The only way to get news out of **Ray Stevens** is through the distaff side of the family. We are informed that, "we reached here (Naples, Fla.) on the 28th

day of December after spending Christmas at Williamsburg, Va. We left there the day after Christmas and came to Naples in three days. We are planning to return home about March 15. When we first arrived here the weather was wonderfully warm and balmy. We went swimming a number of times in water 65 or 67 degrees, and Ray played golf nearly every day. The natives do not go in till summer comes, but I'm sure by that time the water would be too warm for us New Englanders. Since the first two weeks the weather has grown steadily colder, and last night (January 30) the temperature was 33 degrees. Our electric blankets would have been most welcome."

If you want to have a little fun where you live, try the following: Having been exposed to an organization of retired business and professional men in Summit, N.J. called The Old Guard, your Secretary sent the following press release to the Hartford newspapers, all radio and TV stations, and local churches of all denominations:

"Retired Business and Professional Men to Organize. Retired business and professional men in the general vicinity of West Hartford will assemble at the West Hartford Y.M.C.A., 21 North Main Street, on Tuesday, February 1, at 10:30 a.m. to discuss organizing a group in the West Hartford area similar to others in different parts of the country. The objectives are fellowship, entertainment, and exchange of ideas for retired men of the business and professional world. Weekly meetings are planned, starting at 10:30 a.m. and ending at noon. The first half hour of regular meetings will be devoted to business. The remaining time will be a planned program. A wide variety of informative and entertaining programs will be planned, including interesting speakers, movies, and group trips. Informal and entertaining activities will be planned for the summer months. In setting up the program for the group, the organizers looked to other successful groups for guidance. A New Jersey group, for instance, in a town about the same size and make up of West Hartford, has a membership limit of 400 and an average attendance of about 200.

"Retired business and professional men who are interested are cordially invited to attend the first meeting at the West Hartford YMCA."

There were no collaborators, no telephone calls, no conversations with others—nothing but the news and TV publicity. You ask what happened? On Tuesday, February 1, 37 men showed up, and each introduced himself, telling about his former business connection and his hobbies. Last Tuesday, February 8, 28 more men showed up making a total of 65 in all. An abundance of enthusiasm developed including hobby committees. Try it out. Maybe you'll find that engineers, company officers, and other retired professional and business men will be hungry to participate.—**W. I. McNeill**, Secretary (called back into service), 107 Wood Pond Road, West Hartford, Conn. 06107; **C. Dix Proctor**, Assistant Secretary (off on an African Freighter cruise), PO Box 336, Lincoln Park, N.J. 07035.

'18

One of the trenchant truths, continually impressed upon us as undergraduates, was that to fudge our data or to juggle our facts was at once to lose all professional standing. To this, after another half century of observation, I would add that when people are unwilling to fight for truth, soon there is no truth left much worth fighting for. So let's get the record straight. My February notes, as originally expressed, delicately suggested that the Review had unwittingly omitted (but not deleted) a paragraph about our interim reunion which should have been included in the November account. As changed by whomever prepares the class notes, the account reads as though it was my fault. The truth is that said paragraph was in the Review office on August 26th, whereas it was not due for the November issue until September 15th. A few years ago, when the battle was fought making clear that a class secretary's mandate comes from his classmates and nowhere else, I had telephone calls from fellow secretaries hundreds of miles away complaining that some of their sentences had been altered to mean the opposite of what they had written. From **Earl Collins** comes what he calls, "A belated reply to your letter of last summer following the get together at Osterville. Because a long time has elapsed since my doings have appeared in The Review, perhaps I should bring the record up to date. After a few years in the paint business in Boston with Pittsburgh Plate Glass Company, I joined the Union Carbide Chemicals Division in 1928. After handling industrial applications of Pyrofax Gas, together with both industrial and municipal design and installation of butane-air gas plants from their New York headquarters, I wound up in 1934 with the Anti-freeze Division involved with research and development of automotive anti-freeze formulas and their marketing. In addition, at the end of the war in 1945, we took over an insect repellent which the Corporation had developed for use by the armed services all over the world, and put it on the retail market under the trade name "6-12" Insect Repellent. Doubtless this product is familiar to those who like to hunt or fish, or spend time out of doors in spite of biting insects. We lived in Great Neck, L.I., for nearly 25 years, where both Maxine and I were active in school affairs while Ted and Sally were growing up. Maxine went so far as to take on the presidency of the High School parent-teacher group not long after there had been a pupil strike, with its consequent repercussions. I served eight years on the Board of Trustees of the Great Neck Library System when it was growing from a single building to a central library with three very active branches. I rode the 'Wrong' Island Railroad for 25 years when a seat was rare as hen's teeth, cars were either superheated in the summer or supercooled in the winter, and you never knew whether a train would arrive or leave in defiance of schedules. Our children are married now: Sally is Mrs. Wm. J. McVie living in Westbury, L.I. with

two children. Ted has four, with a fifth actually due to arrive today. He lives in Deerfield, Ill., and is in business for himself. In 1943, during the war, when Union Carbide was about 95% on war work, and while continuously handling two phones at a time for eight hours a day, I had a lovely coronary thrombosis which kept me sidelined for six months. However, I have managed to live 22 years on borrowed time due to the skill of our family doctor and the careful treatment demanded by our company's medical staff. In 1953, Maxine suffered a serious illness which finally led to my early retirement. In 1955 we moved to Eustis, Fla., and have lived here ever since. For a few years, I was busy in civic affairs: on the Eustis Zoning Bd; seven years as a member of the Eustis Library Board of Trustees; member of the Vestry and Treasurer of the local Episcopal Church. Later, I was shanghaied into taking over the organ at the Episcopal Church while the regular organist was busy having a baby. This temporary activity turned out to be the pattern for succeeding years during which I have been kept busy as organist in several churches. But due to recent troubles with that well-known scourge known as angina, I have resigned in favor of complete idleness. However, I do try to find time to butcher a bit of wood in my workshop equipped with power tools, to keep enlarging my collection of 2,000 colored slides which record various trips which we have made over the years, and to play my Hammond organ for my own amazement. In between times, there is a half acre of lawn to be mowed, irrigated and babied, and steps taken to control varmints which are anxious to eat everything in sight. It has been a disappointment not to be able to attend any of the reunions in recent years, but they occur at a time when it has not been possible for us to be away. However, The Review does bring news of the members of our class. Incidentally, our class must remember Irving McDaniel who was such a big figure in Tech Shows between 1914 and 1918. A few days ago, I had a letter from him concerning his 50th reunion which is evidently to be quite an affair. He is putting together on tape many of the Tech Show tunes of that era as a part of the entertainment. This outline wanders off in all directions, I fear, but that's the way this typewriter prefers to speak and I don't seem to have any real control over it. My best wishes to everyone for a good year."

From Florida also comes data from **Sherman MacGregor**. "As far as news of my Odyssey goes," he begins, "you could dig out the last letter I wrote you and use it all over again. I work at Bay Pines Veterans Hospital twice a week, Boy Scouts once a week, rehearse my next Little Theatre play at least twice a week, and take care of my 'estate' in the remaining hours. People tell me that I am in a rut, but I prefer to think that I am in a very comfortable groove. Incidentally, I haven't shuffled a board for over a year now! Things that happen on TV are no novelty, to be sure, but occasionally they are amusing. The other night we were watching a very tense scene, with a doctor

trying to save a dying child. He said tensely, 'I'm afraid there's no hope—his temperature is 104 degrees.' And immediately there flashed on the screen the words 'No frost danger tonight.' The local weather bureau keeps us informed in this way, but that time they chose an odd moment to do it. I had a rather new experience a short time ago. In the **Corrective Therapy Department** at the hospital where I work is a little man who is recovering from a bad stroke. His legs, by dint of much patient exercise, have got back some of their usefulness, though not as much as could be desired. The fact that he was confined to his wheel chair galled him badly. He was always after the doctor to let him walk from his room to the mess hall (about a block). One morning he had a long chat with the doctor. After the doctor left, he burst into tears. I tried to find out what the matter was, but to no avail. So I let it go. We went on with his exercises. About a half hour later, I asked him again what the trouble was. He told me that the doctor had at last consented to let him walk to the mess hall unaided! He was so overjoyed he couldn't restrain himself. For the last two years I have been wearing a white chin whisker. [That makes us brothers under the chin, Sherm!] Being bald on top, I like to feel that my beard proves I can grow hair somewhere! I was afraid at first that it would limit my participation in Little Theatre plays. To my amazement, I have participated in ten or eleven plays since then, and in every case the beard has been acceptable in the part. Well, Monty Woolly did OK with his beautiful growth! It was bigger than mine, but no whiter! People get such an erroneous idea of Florida, until they have been down here. I finally talked my sister into spending her two week September vacation with me. The day after her arrival, I suggested we go for a swim. She was positively hilarious about such an idea—go for a swim in water where the temperature was 84 degrees! Nothing could be further from her mind! Why, it would be like swimming in bath water! (How many times I've heard that!) But she did agree to go to the beach with me. Of course, when we got there, she—in common with most women—had to take off her shoes and stockings and paddle. To her great amazement, the water was a delightfully refreshing temperature. Well, Thoreau had his Walden, you have your Thordike and I have my Tampa Bay."

Last month we left Sax and Louise Fletcher in pursuit of truth on the Inland Sea of Japan. "The trip," he continues, "was an all day affair which turned out to be quite rough at dinner time. Half the people had to leave the table. On shore next morning we had a three hour sight-seeing tour visiting the sulphur springs and Takasakyame Mt. where wild monkeys abound. Following a visit to the Kubo Museum at Kyushu University next morning, we took the train for Hiroshima. This is now a completely new city with only a few relics of the bombing. The museum is a bit gruesome, mostly pictures of what happened to the city and to the people. Not far from Hiroshima is the beautiful Itsukushina Shrine where

we watched the Bugaku dance by Shinto Priests. I found it not too interesting. The next afternoon we attended the Takarazuka Grand Theatre to see the spectacular all-girl Dance Revue. I have seen many musicals including American and French but none of them compare with the costumes and scenery of this. There are four groups of these girls appearing all over the world. They go through a long period of training, and under strict discipline at all times, are both beautiful and talented. Our next important stop was the ancient capital city of Nara. We visited Kasuga Shrine built in the 8th century and Todaiji Temple which houses the 72 foot bronze Buddha, the largest of its kind in the world built in the 7th and 8th century. Another high spot of the trip was the visit to Nikko where the Shinkyo sacred bridge is located as well as the Toshogu Shrine. This is ornate but a superb blend of artificial splendor and natural beauty. Here also is Lake Chugunji and Ryuzu waterfall as well as Kegon waterfall. To reach this area we had to go over the Iroha-Zaka Hairpin Drive with the sharpest turns (43 of them) I have ever seen. Thrilling, but I was glad when it was over. We were both much impressed by the Japanese people. They are clean, honest, energetic and hard working. I lost my camera in Beppo, left it on the tourist bus. It had no identification marks, but I reported it several hours later to our tour guide. Four days and several hundred miles further on I got it back. That would not happen in the States. The school children are constantly taken on tours to visit shrines, parks and all points of interest as part of their education. They all dress alike, the girls in sailor blouses and the boys in uniforms similar to those of our freshman drill. The Japanese are always courteous and anxious to please. This is not in expectation of any gratuity, for there is no tipping. The taxis are cheap, but practically everything else is on a par with the States. One warning: if you ever go to Japan, keep your wife out of a pearl store. From Japan we went to Hong Kong, but that is another story."

True to his promise, **Jim Flint** did send some data about himself. "After the usual nice retirement affairs in May of 1963, coupled with the presentation of an Accutron watch which had special significance to me, I started to slowly go nuts. I mention the watch because I spent most of my adult life in applying vibration to practical industrial use. However, from a totally unexpected source I was rescued in July 1963. There had been a Commission created by the Legislature known as the State Underground Parking Commission, which was just getting ready to construct a 1200 car three level facility under the Statehouse grounds. I was asked to assist them in this project as a sort of Jack of all trades and was I delighted to accept! It turned out to be a wonderful experience. For the next 500 days I ran all over the place, from the day when the lawn was torn up and the trees cut down until we had a hole 650 ft. by 300 ft. by about 50 ft. deep and then filled it up with reinforced concrete and finally covered it all up, planted the new lawn and

trees. It was a big fun job. Mrs. Flint's comment was that my retirement lasted 90 days! For about a year I have watched over the actual operation of the Facility like an old Mother Hen. I have promised my wife that I will now try retirement again, so next month we leave for a nice trip 'down under.' We plan to go to New Zealand and Australia, stopping at Tahiti and Fiji on the way. From Australia we go to Hong Kong with stops at Singapore and Kuala Lumpur. From Hong Kong to Tokyo, with a stop at Taipei, and from Tokyo return home with stops at Honolulu and San Francisco. We fly all the way and expect to be away until the last of April. We spent four months last summer at our place in Montana, which included a lovely trip by car into the Canadian Rockies and then by the beautiful Trans-Canada highway to Victoria where we gave the car and ourselves a boat ride to Seattle and then back to Montana. We are both fine and are looking forward to our trip with much anticipation."

After the leaves let go, making a plunge to earth, there is always an increase in the number of us who have made their final fight for truth. News comes that **Harold F. O'Donnell** died on October 19th. . . . As the result of a cerebral hemorrhage, **Maurice Landis** followed on December 10th. Last August the LaSalle Steel Company of Chicago paid honor to his 46 years of service as a staff engineer and metallurgist. He is survived by his widow and two children. . . . On December 12th **Claude T. Crapo** died in New York. . . . After many years of meticulously taking care of himself following a heart attack, **Carleton Tucker** finally succumbed on January 17. He had been at M.I.T. a total of 51 years, which began as a freshman and lasted until he died. It was there in his office that the end came. He was born in Whitman, and there he lived his entire life. He served the town on its School Committee from 1928 to 1947, occupying the chairmanship from 1930 to 1938. He was interested in town history, and in the attempt to save the old south shore railroad. Of his professional achievements no comment is necessary here. Carleton is survived by his widow, two daughters, and four grandchildren. Louise wrote me soon after the funeral, "We had such a good time at the Wianno Club last June. Little did we realize it would be our last time with you. I'm glad the class didn't wait until 1968 to have another reunion." With the hand of His creative love, God asks us to die but once. We all wish to do so with dignity, to be buried with honor, and to be remembered with affection for the best of our past moments.—**F. Alexander Magoun**, Secretary, Jaffrey, N.H.

'19

Lloyd Sorenson writes that he retired on January 1, 1966, from the Newport News Shipyard where he had worked for 47½ years. He has built a new home near Yorktown. He and his wife are both golfers, and he has bought a 33 foot express cruiser. "We are going to keep busy.

See you at the 50th Reunion." . . . **Louis J. Grayson** is still in the insurance business heading his own agency. In the last three years, however, he has taken off considerable time for trips. Marilyn, his daughter, is attending Syracuse University and is majoring in Photo-Journalism, one of the University's most difficult courses. She accompanied them this last summer on a trip to Great Britain where they toured from Devon to Aberdeen and Banff in northern Scotland.

Joseph Kaufman, a physical sciences administrator in the Research and Development Directorate, U.S. Army Material Command (AMC), Washington, was awarded in November, 1965, the meritorious Civilian Service Award. The citation reads in part, "During the period August 1962 to October 1965, Mr. Kaufman's utilization of his valuable experience and incisive analysis in direction of the Army Industrial Research program and staff supervision of the AMC basic research projects constituted professional service of a unique character." After serving with the National Bureau of Standards from 1942, he transferred to the Office, Chief of Ordnance, where he was responsible for supervising research work in the physical sciences. Upon reorganization of the Army in 1962, the Office, Chief of Ordnance, was integrated into the Army Material Command, and at that time Mr. Kaufman transferred to AMC.

Your Secretary is spending the winter in Delray Beach, Fla., and in spite of some cold is enjoying golf and frequent swims in the ocean. I will be back in Scarsdale the first of April and hope to find lots of news of 1919. . . . We regret to announce the death of **H. Stanley Weymouth**, of Bangor, Maine, on January 12, 1966. Also **Pedro A. Piza**, San Juan, Puerto Rico, apparently some years ago. . . . New addresses are: **Edward L. Sache**, 9 Sydney St., Dorchester, Mass. 02125; **George A. Parks**, 23 Maynelle Drive, South Yarmouth, Mass. 02675.—**Eugene R. Smoley**, Secretary, 30 School Lane, Scarsdale, N.Y.

'20

We have welcome news of **Hal Hunter**, thoughtfully forwarded by **Norrie Abbott**. Hal is a leading citizen of Rome, Ga., address 706 River Ave. Before his retirement in 1963 he was manager of engineering for Celanese Fibers Company. Among other things he has served as chairman of the State Board of Engineering Examiners, Director of the National Society of Professional Engineers, Chairman of the War Price and Rationing Board, Chairman of the deacons, elder and trustee of the First Presbyterian Church and Director of the Coosa Country Club. Hal has also served with distinction as local representative of the M.I.T. Educational Council. He has four sons, two grandsons and two granddaughters—so far. The two younger boys are not yet married. Hal and Lolly shuttle from Florida in the winter to Canada and Nassau in the summer. He plays a good game of golf and she is a bridge ex-

pert and a lifetime flower show judge. It's a pleasure to report on one more classmate who has led and is still leading an active and useful life.

Foster and **Gladys Doane** recently returned from a 30,000 mile trip covering England, Cairo, New Delhi, Calcutta, Darjeeling, Bangkok, Hong Kong, Singapore, Christchurch, Mt. Cook, Auckland, Fiji, all four of the main Hawaiian Islands, Los Angeles and Tijuana. What a trip! Foster, who is one of the country's top pulp and paper consulting engineers, mixed some business with pleasure, visiting mills in India and Australia. The Doanes were accompanied part way by **Art Wakeman**, '21, and his wife. Foster says he and Gladys spent Christmas in the Fiji Islands where they were entertained by native songs and war dances as a relaxing substitute for TV, radio and newspapers, New Year's in Honolulu, the noisiest in his experience due to the Chinese tradition of ushering in the new year with firecrackers. When they finally got home it was to be greeted by the worst blizzard of the year in Neenah, Wis. Says Foster, "It was nice, though, to feel the snow on my face and to hear it scrunch underfoot." Foster certainly rates a high ranking amongst our select company of world travelers which includes such stalwarts as **Chuck Reed**, **Perk Bugbee**, **Jim Gibson**, **Norrie Abbott** and **Bill Dewey**, to mention but a few. One tip to them all from Foster. He says, "The greater part of our flying was done on Air India, and we found the service superb."

Fred Brooks, who is professor of agricultural engineering at University of California, Davis, received the award given by the American Meteorological Society for Outstanding Achievement in Bioclimatology, "in recognition of his role as a prominent pioneer in the application of physical principles to problems of bioclimatology, particularly in regard to agricultural crops." Dr. Brooks, who graduated from the University of Illinois before he got his doctor's degree at M.I.T., has been associated with U. of C. for 35 years, except for a tour of sea duty with the Navy for the purpose of analyzing the dispersion of smoke screens by atmospheric turbulence.

Examination of the current roster of the M.I.T. Corporation discloses that **Archibald P. Cochran** and **L. G. Lee Thomas** are members of the Development Committee and that **Homer V. Howes** continues on the Libraries Visiting Committee.

Ernie Huntress, long a professor of chemistry at the Institute has moved from Cambridge to Melrose, Mass., address 585 Franklin St. . . . **Norrie** and **Betty Abbott** included the M.I.T. "Fiesta" in Mexico City last month while on a grand tour of Mexico. We are eager to hear all about it, **Norrie**.—**Harold Bugbee**, 21 Everell Road, Winchester, Mass. 01890

'21

Countdown holding at just two—two months to go to the anticipated enjoyment of the 45th Reunion celebration

from June 9 through 12 at the Griswold Hotel and Country Club in Groton, Conn., to be followed on June 13 by Alumni Day 1966 on the amazing new M.I.T. campus in Cambridge. These will be five days of sheer pleasure for you and your wife, together with your best friends on earth, all of whom are eagerly looking forward to seeing you there. Please plan to attend, whether it's your first time or you're one of the "regulars." If you have already sent in your questionnaire to your Secretary and indicated probable attendance, you now have the latest reunion mailing and the final registration form to use in applying for a reservation at the Griswold and for the no-charge dormitory room and breakfasts for you and your wife in Cambridge, which have been so generously donated by Technology for those who come to Alumni Day via the reunion at the Griswold. If you haven't received the registration form, better return that completed questionnaire to your Secretary at once and your name will be restored to the mailing file for reunion information. Even if you can't possibly attend the June events, we urge you to return the questionnaire anyhow, so as to help your Secretary maintain these news columns and to keep M.I.T. files up to date. Many thanks for your cooperation. We have some statistics on indicated reunion attendance as of this early February date of writing—and despite a quotation in the syndicated "Thought for today" attributed to President Alfred E. Perlman '23 of the New York Central Railroad: "Some people use statistics as a drunk uses a lamp-post—more to lean on than for illumination." Either way, it is a fact that 55% of those who have so far returned the questionnaire say they expect to come back in June, which should result in one of the largest Reunion groups the Class of '21 has ever had. Of this reunioneering group, 57% say they have retired, which seems to indicate that those still actively in business certainly don't intend to let that fact hamper them in joining the happy throng! Of the total number who have answered, 60% say they have retired, so there is no justification for Dave Woodbury to brag that he is the only one in the Class who is still working!

Featured in a "Business Week" article entitled "Katy Puts an Old Hand in the Cab," is one of the most famous members of the Class of '21, **John W. Barriger**, who, at mandatory retirement at the end of 1964, left the presidency of the most profitable railroad in the country, the Pittsburgh and Lake Erie, later to become President of the Missouri-Kansas-Texas Railroad Company, which is reportedly second only to the New Haven for being in bad shape. Although the article covers much of what has already been published in these columns, it does give some news of progress under John's capable administration. The road is making a real comeback. In some six months of Barriger's leadership, the daily movement of freight has increased from 600 to 1000 cars. John is quoted as saying that 1300 cars a day will cover fixed charges and still leave something for capital. On John's theory that "No one ever starved himself to pro-

perity," he has cleaned up the road, patched the track, stopped what little passenger service remained, ended mass layoffs and added freight trains. The article says: "He is so widely known and liked that, even with bad service, he was able to increase traffic by getting his friends to ship over the Katy. He promised that if they would give him the traffic, he would use the increased revenue to improve service and to pay their back damage claims. Enough shippers and connecting railroads believed in him to divert their cars his way and start the railroad on its long, painful path to recovery." John expects the railroad to have seen its last deficit month by the end of 1966. He works some 70 hours a week and, when someone remarked on how well he looked, John retorted: "There's nothing tiring about solving problems—so long as they are not of your own making." When he does relax, he goes to his 26 tons of neatly catalogued books and pictures in his home (the finest library of railroading in the country, which required the addition of steel beams to his St. Louis home) and reads up on railroading and military history. He is still famous for transacting business with groups of people at breakfast—he doesn't drink; breakfast is the least expensive meal and he has never had to worry about adjourning a breakfast meeting. He is also famous for talking and the article tells an amusing story on his ability to listen, even when he is talking. While lecturing to an audience of analysts during an inspection trip on his P. & L.E. office car, speeding along the parent New York Central tracks, a long freight shot by on an adjacent track at a relative speed of at least 150 miles an hour. Though John didn't stop his discussion, he stated, when the freight had passed, that it contained 128 cars. A Central official checked his trainsheet and insisted it was 129 cars. John is said to have replied: "On the P. & L.E., we don't count the caboose." Busy as he is on what must be the most trying experience of his brilliant career, John writes that he and Elizabeth will be on hand at the Griswold and also for Alumni Day. We salute you, John.

Arthur R. Harvey is chief engineer and a director of Gardner Board and Carton Company, and makes his home at 101 Kensington St., Middletown, Ohio 45042. . . . **Robert L. Moore**, director and chairman of the executive committee of the Sheraton Hotel Corp., 470 Atlantic Ave., Boston, Mass. 02210, has been elected a director and executive committee member of the Hanover Insurance Company, New York City. Bob is also president of Investment Trust of Boston, a mutual fund, and chairman of the board of Devonshire Street Fund, Inc. . . . **Dr. David R. Merrill**, a former instructor in chemical engineering at Technology and, until recently, a consultant for Rohm and Haas Co., Bristol, Pa., has moved where your Secretary once lived and gives his address as 425 Chestnut St., Moorestown, N.J. 08057. . . . **John B. Baker** has retired as division chief engineer of the Timken Roller Bearing Co., Canton, Ohio, and writes that he now lives at Apt. C-106, 19417 Gulf Blvd., Indian Rocks Beach,

Fla. 33535. . . . **Winter Dean** says he retired as chairman of the board of General Trading Co., St. Paul, Minn. He has moved from his former home at White Bear Lake, Minn., and can now be reached at 8111 Camino del Oro, La Jolla, Calif. 92037. Wint and Muriel ('23) have five married children and 15 grandchildren. . . . Through the courtesy of Richard L. Bolin '50, we learn that **Dr. Manuel Sandoval Vallarta** is one of three members of Mexico's nuclear energy commission and another is Dr. Carlos F. Graef '40. Their address is in care of Comisión Nacional de Energía Nuclear, Avenida Insurgentes Sur 1079—3er Piso, Mexico, D.F. . . . A welcome letter from **A. Ilsley Bradley** says: "Just to set the record straight, I live at the University Club, 3813 Euclid Ave., Cleveland, Ohio 44115. My real estate office is at 326 Bulkley Bldg., 1501 Euclid Ave., Cleveland 44115. I am hoping to make the 45th. Spent Christmas in Pinehurst, N.C., for the second season—I do like golf down there." . . . **Hugh F. Peirson** has left Los Angeles and now receives mail at 1147 Mattingly Rd., Hinckley, Ohio 44233.

William J. Sherry, president of the Sherry Petroleum Corporation, 1801 First National Bldg., Tulsa, Okla. 74103, writes: "Cac, I want to express my appreciation for the many years that you have kept us all informed on the whereabouts and the doings of the Class of '21. I was particularly interested in the January issue of the Review to learn that Helier Rodríguez had been in California. I owe him a letter, which I will get off right away. I certainly hope that Graciela and he can attend the reunion this June. With every good wish for 1966." Bill and Margaret take the honors for the largest number of children in the Class, with eight—three of whom are married. There are nine grandchildren. Bill says he and Margaret will definitely attend the reunion and Alumni Day. . . . **Philip H. Hatch**, who retired as the chief mechanical officer of the Long Island Railroad, wrote an interesting card from Tesouraria, Brazil, but forgot to include his address. Phil says: "We are down here on a year's consulting job with Coverdale and Colpitts on the Brazilian Railways. Find the country and the work most interesting. Expect to finish by next November. We're staying in a hotel on Copacabana Beach. Having 103-degree weather in January is really a novel experience. Best regards." . . . **Ednah Blanchard**, 64 High St., Hingham, Mass. 02043, says: "I much enjoy reading your Class of '21 news. How is retirement going? Hope to see you at Alumni Day 1966." . . . **Howard Le Fevre**, 20 Gloucester St., Apt. 1-R, Boston, Mass. 02115, writes that he retired as of the first of this year from the U.S. Smelting Refining and Mining Company, of which he had been vice-president and manager of metal sales. . . . **Philip A. Nelles, Jr.**, 21 Sunset Rd., Stoneham, Mass. 02180, reports: "I inquired of Irwin L. Moore '20, former president of the New England Electric System, if he was going to join us at the 45th Reunion but he was non-committal and too anxious to get through the crowd to his bride of a year.

It was at the Christmas party of my old Boston office of the Mystic Valley Gas Co. Christmas is more than pleasant for Kay and me this year, since it's our first together and she is showing real improvement from the operation performed last September to remove the pin and old fracture ball in the hip joint and have a steel ball inserted. She can use one crutch around the house and walk a little from room to room. May this year be your best, too, and we hope you and Maxine enjoy retirement as much as we do." . . . From Helen and **Edmund G. Farrand**, Kinchafoonee Lodge, Leesburg, Ga., 31763, comes a cheery: "Hi, Cac! The one thought that comes to mind is that I should take this Christmas occasion to say how much I and our whole Class owe to you for keeping us in living touch with each other. Our best to you and Mac." . . . A note from Betty and **Dug Jackson** at yearend gave a new address for **Edwin L. Rose**, who has moved from Florida to 397 Lima St., Sierra Madre, Calif. Dug says: "Had a wonderful trip around the world! For most of the trip, we had good weather; we hit the southern tip of a typhoon out of Yokohama and the Pacific crossing was rough. We were delayed seventeen hours, so did not see Harry Field in Honolulu or even talk to him. Sent him a radio message from the ship. We arrived in Honolulu at midnight, took a three-hour taxi ride around the city and sailed again at 4 a.m. Saw the sunrise as we passed Diamond Head. Otherwise the trip was grand and unforgettable. We arrived in Miami just before Christmas and spent the holidays with our daughter, Betsy, and her family in Mt. Dora, Fla. Expect to be home at Tetrastemma before the end of January." Christmas greetings from the Jacksons included the usual clever holiday jingle acrostic.

A very long letter from **Jack and Marge Kendall**, 401 Hermosa Pl., South Pasadena, Calif. 91030, brought us up to date on their Honolulu trip and some of the highlights of 1965, during which they spent several days at Big Sur, saw Bob and his family there and visited with Jack's family enroute to Colorado. They were in Hawaii for eleven days, while Jack attended an I.C.C. hearing to establish carrier rights in the Islands. They made many interesting side trips. Jack reports a long conversation with Harry Field. Jack also sent us the complete souvenir programs for the Tournament of Roses parade and the Rose Bowl game, which made our television enjoyment of these colorful events the more enjoyable. He also dug up some choice U.S. stamped envelopes in mint condition, bearing fractional postage values, with which to enhance our philatelic collection. Hope everyone will join to help Jack and Marge celebrate their fortieth wedding anniversary at the reunion. . . . **Saul and Rigi Silverstein** arrived home after ten weeks of circling the globe in the interest of Rogers Corporation, plus several management seminars—in time to celebrate their 38th wedding anniversary on New Year's Day. His 19th foreign trip in 13 years, it is covered in detail in 15 issues of Saul's inimitable "journal" and "ledger" reports—the journal portion is a diary of

his daily activities and the ledger incorporates overall observations and comments on city, country, economics, politics, etc. We had occasion to write Saul a personal note enroute and discover we have crashed into the big-time with his subsequent reference to it in Vol. 19, No. 13! One of his first acts on arrival at his office was to send us a long, cordial reply—which hints he may again hit the "world" circuit after he and Rigi attend the Reunion and Alumni Day. Wotta man! . . . A letter from Class Prexy **Raymond A. St. Laurent** reports a phone call he received from **Ollie Bardes** in Florida, asking for Saul Silverstein's phone number to get further data on Saul's recent westward trip around the world, as described in these columns. We're glad to know our reportorial efforts have practical as well as news value. Saul did provide the requested suggestions, which Ollie will use in his trip, covering about 40 days of travel, leaving Los Angeles April 19 for Honolulu and Australia, among other stops. Ollie and Olive will take youngest daughter, Mary; he told Ray he would be back in time to attend the Reunion and Alumni Day, although we haven't yet received his completed questionnaire. Ollie maintains a full schedule of work with his several growing Cincinnati and Canadian based enterprises and manages to squeeze in a few leisure moments of golf in the south. . . . We have a long personal letter from **Howard F. MacMillin** in response to a letter we sent him with an old photograph, taken back in our days at Technology. Given to us by Harold D. Moore's widow, Florence, it shows Howard, the late Murray Jones, Spud Moore and someone we could not identify. Howard reports: "About the picture, the location is in front of the Kappa Sigma house at 512 Commonwealth Ave., looking across Kenmore Square. The fourth chap is John L. Parsons '17 of Kappa Sigma, who was living at the house and teaching chemistry at Boston University. I regret the passing of my old friend, Spud Moore. We lived together for all four years. In fact, Cac, all of my close friends in '21 have passed on, including Murray Jones and Bill Kennedy. Although Bill and I were in different fraternities, we were both in Course II and worked together and lived together outside our houses." Howard has retired from the family business, the MacMillin Hydraulic Engineering Corporation. His eldest son, who runs the company, and his eldest grandson had been seriously ill but are now reported well on the way to recovery. Howard lives at 840 Tower Rd., Winnetka, Ill. 60093. We're hoping you will see him and Mrs. MacMillin at the June festivities.

A note from **Antonio H. Rodríguez**, Avenida del Generalísimo, 83, Madrid 16, Spain, refers to his hurried trip to the States last summer and continues: "I am and have been very busy organizing a business here. It is a fascinating challenge at this stage of my life." Graciela added her good wishes. We are hoping this grand couple will manage to be here for the big events in June. . . . Writing from 1519 Nuuanu Ave., King 161, Honolulu, Hawaii 96817, **Harry P. Field** says that he

and Catharine will not be able to make the trip here this summer. He continues: "Thanks for your excellent report in the Review, which has just arrived. One of the best things about living in Honolulu is the chance to meet classmates like Saul Silverstein, Jack Kendall and Dug Jackson and to show our island to visitors. Sorry Dug's ship was off schedule and he stopped here only a few hours in the middle of the night. His father, the late Professor Dugald C. Jackson, visited Hawaii in 1926, a few days after we moved here. He was on his way to a meeting of scientists in Japan. I enjoyed knowing him as a visitor as well as one of our professors during our undergraduate days. Thank Maxine for her kind invitation to stop in Brielle on the reunion trip. It would have been fun. You two must follow the Kurth's example and pay us a visit before Honolulu gets to look like Florida! Much aloha." Thanks, Harry. The absence of Chick Kurth's questionnaire is probably explained by his trip and we'll look forward to a note from Chick, describing his travels. . . . **Laurence O. Buckner**, 2630 Durham Rd., Haines Acres, York, Pa. 17403, says he and Mary are well and happy and adds: "Am working on a scientific test of a residential type heat pump; it will be published in early summer. I am also conducting a class in electric machinery. Hope you are both enjoying your new retirement residence and that Cac has fully recovered from that accident. We read your Class news with great relish and thank you again for a steadfast, well done job." . . . As has been his long-time custom, **Robert F. Miller**, 6931 Chestnut Ave., Falls Church, Va. 22042, sent an up-to-date Christmas photograph of his entire family, now including not only the Miller's six good-looking children but also their photogenic son-in-law, daughter-in-law and five cute grandchildren. Son Bob is on a two-year assignment to the research center of Continental Can Company in Chicago. Youngest daughter, Jean, has been elected president of her college class. Bob and Helen are looking forward to seeing old friends at the reunion. . . . As we complete these notes, a cordial and most appreciated letter has just arrived from **Harold Bugbee**, Secretary of the Class of 1920, who writes: "If you have not heard from **Art Wakeman** of your Class recently, you may not know that he and his wife, Loraine, got back just before Christmas from a trip to England, Cairo, India, Bangkok, Hong Kong, Tokyo and Honolulu. Accompanying the Wakemans was my friend and classmate, **Foster Doane '20**, and his wife. Foster and Art were both prominent and highly successful executives in the pulp and paper industry. I gather that they are now both doing consulting work in that industry and that the trip combined business with pleasure. According to Foster, they had a wonderful junket, including a visit to the Taj Mahal and to Darjeeling to inspect the Himalayas. Hope this bit of news may prove useful to you. Trust you are in the best of health and spirits." Many sincere thanks for your thoughtfulness, Harold.

It is with deepest regret that we record the passing of two of our classmates. To

their dear ones, we extend the sincerest sympathy of everyone in the Class. . . . **Irving Gardner (Jimmie) Smith** of 16884 S.W. Bryant Rd., Lake Oswego, Ore. 97034, died on October 31, 1965. A native of Mason City, Iowa, where he was born on May 18, 1899, he had lived in the Portland, Ore., area for more than 30 years. He was graduated from the University of Oregon with a bachelor's degree in architecture in 1920 and was associated with us in graduate study in Course IV. He was a member of various architectural firms on the west coast and in Hawaii, including A. E. Doyle and Associates and the Office of Pietro Belluschi, both of Portland. A registered architect in Oregon and Washington, he was a fellow of the American Institute of Architects and had served as president of the Oregon chapter and as director of the northwest district. His memberships included the Oregon Building Congress, Portland Chamber of Commerce, Multnomah Athletic Club, Sertoma Club of Portland and Phi Delta Theta. He was a veteran of World War I and was active in Christ Episcopal Church in Lake Oswego. He is survived by his wife, Frances; a son, Frederick G., of Beaverton, Ore.; a sister, Mrs. Gladys E. Steers of Portland; and four grandchildren. We are indebted to Mrs. Smith for aid in preparing these notes and acknowledge her letter of appreciation to the Class for our expression of sympathy. . . . **Winfield Scott Libbey**, 612 Main St., Lewiston, Maine 04242, died on December 28, 1965. Born in Lewiston on June 2, 1896, he prepared at Lewiston High School, entered Harvard and left in 1918 to enlist in the Navy. He received a commission and, upon discharge at the end of the war, he joined us in Course I at the Institute. He became associated with the family business, the W. S. Libbey Co., a Lewiston textile firm, and was its president at the time of his death. He was also an officer of the Spring Street Co., a Lewiston realty organization. His memberships included Rotary and the Harvard Club of Boston. He was active in numerous civic capacities, among them the board of trustees of the Central Maine General Hospital and the board of overseers of Bates College. He had been a commissioner and council chairman of Pine Tree Council of the Boy Scouts of America and was awarded the highest Scouting honor, the Silver Beaver, for "distinguished service to boyhood." He was also prominent in P.T.A. work. He had been the county civil defense chairman, coordinator and warning district controller prior to re-entry into naval service at the outbreak of World War II. He served for three years and was discharged in 1945 with the rank of commander. He received a citation from the Navy and continued to serve in the Naval Reserve. He is survived by his wife, the former Helen McCarthy; three daughters, Mrs. Alexander D. Holman of Lewiston, Mrs. Fionan F. O'Halloran of Dublin, Ireland, and Mrs. Philip H. Meldrum of Wellesley, Mass.; three sons, W. Scott Libbey, III, (M.I.T. '43) of Pacific Palisades, Calif., John Shaw Libbey of Santa Rafael, Calif. and Paul R. Libbey of Lewiston; two sisters, Miss Alla Libbey

of Lewiston and Mrs. Gertrude L. Anthony of Boston; and 25 grandchildren. We are indebted to Mrs. Libbey for aid in preparing these notes and for her letter of thanks to the Class for the sympathy extended to her.

We urge you to dig out that questionnaire from the reunion mailing you received last December and mail it back AT ONCE to your Secretary. Only in this manner will you be certain to receive later mailings concerning the reunion and the participation of the Class of '21 in Alumni Day 1966. We further urge that you cooperate by returning the questionnaire to us even if you do not now plan to attend the June events—in order to bring our files up to date and to help us maintain these columns in the Review. If you can't locate the questionnaire blank, a post card to your Secretary will bring a duplicate. Please act NOW!—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, New Jersey 08730; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, Inc., 19 Temple Place, Boston, Mass. 02111.

'22

The usual weather report from western New York as of the middle of February includes two week-ends of snow and therefore we have had good skiing. At the moment it has melted from the streets of downtown Buffalo. To continue on the sporting scene, our Augusta golf brought in a slight profit but not enough to be taxable. The weather was ideal—sunny at 50 degrees. We start our Australia Trade Mission on February 20, fly by way of San Francisco, Hawaii and the Fiji Islands. A week will be spent travelling around Auckland and to Wellington on the north island of New Zealand, then a few days in and around Christchurch on the south island. From Melbourne we will spend a day in Hobart, Tasmania and then fly to Sidney. Dorothy and I hope to stop for a couple days in Fiji and Hawaii on the way home about the middle of March. By coming back in this direction we will gain the day that we lose on the way out. Drop in at Buffalo any time thereafter to see the beautiful slide presentation!

We have newspaper photographs of **Oscar Horovitz** and his brother **Samuel B.**, who presented colored movies in January to the New Century Club at an International Wine Tasting evening in the Harvard Club of Boston. Oscar's brother also lectures and travels throughout the world accumulating a splendid collection of moving pictures. Oscar is billed as the only American five-star motion picture exhibitor in the Photographic Society of America, having won 83 awards in national and international amateur competition. We hope to see his latest prize-winning movies at our 45th Reunion in June of 1967.

Secretary **Harold Bugbee** of M.I.T. 1920 has been checking up on **Horace McCurdy** telling of his many civic activities to keep him fully occupied. **Harold**

has been doing quite a bit of traveling with **Ken Sutherland**. Last summer the two couples went to Hawaii and had previously spent quite a little time in Europe. . . . **Parke Appel** has enclosed a clipping of the sudden death of our favorite professor, **Carlton Tucker**, Professor Emeritus of Electrical Engineering. We both enjoyed our years of working with Professor Tucker at the Institute. **Parke** and **Madeline** are planning an eight week trip to western Europe in August and September. They are both on a strict diet getting ready for the "wine and dine circuit" on their travels.

Notice has been received that **Charles S. Comey** has moved from Michigan to **Jenson Beach, Fla.**—17 Key Lime Drive, Ocean Breeze Park (that reminds us of a pie by the same name); **Stephen B. Neiley** has reported in from **West Dennis, Mass.**; and **Robert H. Brown** from **Fitchburg**. **Edward A. Merrill** is still in **San Francisco**. And so we remain—with a kangaroo hop and a jack rabbit ear—searching and listening for Class Notes.—**Whitworth Ferguson**, Secretary, 333 Ellicott St., Buffalo, N.Y. 14203; **Oscar Horovitz**, Assistant Secretary, 33 Island St., Boston, Mass.

'23

A Petro/Chem Engineer Profile of November 1965 states in part: "The man who probably did more than any single person toward defeating the Nazis during that cold Russian winter 22 years ago was **Dr. Herman A. Bruson**. And he did it with U.S. Patent No. 2,091,627 issued August 31, 1937. . . . **Dr. Bruson**, now a vice-president and senior scientist of **Olin Mathieson Chemical Corporation**, was working on polymers of higher alkyl methacrylates during the mid-'30's. He found if he put some of these polymers in ordinary motor oil, the oil would stay about the same thickness or viscosity when it was subjected to extreme heat or extreme cold. In writing up his patent **Dr. Bruson**, an artillery reserve officer, mentioned that the treated oil could be useful as a recoil for big guns. A Commander **Earl** of the U.S. Naval Laboratories saw that paragraph and ordered some for evaluation by the military. **Dr. Bruson** recalls he had to complete the order in his laboratory. A short while later, Russian tanks were becoming immobile because of the extreme cold. They asked their allies for aid, and the United States Army called on **Dr. Bruson** to prepare more of his special oil. As a result the Russian tanks could move when the Nazi tanks were immobile, and the rest is history. In fact, every motorist has since been aided by that patented chemical. It is what makes possible one grade of oil for all weather." The article then goes into how **Dr. Bruson** got into the business of developing new chemicals. Information relative to **Dr. Bruson** receiving the National Association of Manufacturers' "Modern Pioneers in Creative Industry" award will be found in the March issue of these notes. . . . **Herbert L. Hayden**

retired after nearly 37 years with the **DuPont Company**; a retirement party was held at the **Groton Inn** on February 16th 1966. He has served as chairman of the **Housing Board** and as a member of the town (**Lancaster, Mass.**) **Finance Committee**, also as a church treasurer. **Herb's** letter enclosed a map of **South and Central America** which shows that from **October 1, 1965**, to **January 15, 1966**, he practically covered all major cities down the **East Coast** to **Buenos Aires** and up the **West Coast** from **Bariloche Lake District** through **Mexico** to **Miami** and back to **Boston**. On his trip **Herb** had reunions with several of his **M.I.T.** classmates as previously reported in the **March class notes**.

Forrest Fay Lange, who retired as head of the **Mobilization Planning Division, M.E.O.**, **Portsmouth Naval Shipyard, Portsmouth, N.H.**, on **December 30, 1965**, as reported in the **January 1966 class notes**, was honored at another retirement dinner attended by all members of the **Management Engineering Office**, on **December 22, 1965**, at **Warren's Lobster House, Kittery, Maine**. . . . On **January 3, 1966**, in **Worcester, Mass.**, **Hugh S. Ferguson**, who recently retired from the **Norton Company** board of directors and the presidency of **National Research Corporation**, a **Norton Subsidiary**, was presented a silver tray by **Milton P. Higgins**, **Norton's** chairman of the board. The tray, inscribed with the signatures of the 17 directors with whom **Mr. Ferguson** served, symbolized his associates' appreciation of his contributions as a director. **Mr. Ferguson** had served on the board since 1963. President of **National Research** since 1959, he is a director of **The Foxboro Company, Miniature Precision Bearings, Inc.**, and the **Harvard Trust Company**. He was formerly president of **Dewey & Almy Chemical Company**. . . . Word has been received of the death of **George W. Hall, Jr.**, 195 **Brompton Road, Garden City, N.Y.**, but no details are available.

The **Alumni Office** has advised of the following changes of address: **Frank J. Atwood**, 1925 **Harwood Road, Pendennis Mount, Annapolis, Md.** 21401; **Richard C. Kleinberger**, 4 **Birchwood Road, White Plains, N.Y.** 10605; **Roswell A. Merritt**, P.O. Box 66812, **Houston, Texas** 77006; **Robert Sears**, Apt. 1, 2073 **Golden Rain Road, Walnut Creek, Calif.** 94529; **William D. Norwood**, 1932 **Harris Ave., Richland, Wash.** 99352.—**Forrest F. Lange**, Secretary, 1196 **Woodbury Ave., Portsmouth, N.H.** 03801; **Bertrand A. McKittrick**, Assistant Secretary, 78 **Fletcher, Lowell, Mass.** 01852

'24

"**B. Alden Cushman** was elected president of **International Holdings Corporation**, a closed-end investment company." So reports the **Wall Street Journal**. **Cush**, as you will remember, is also a vice-president of **J. Henry Schroder Banking Corporation** and the **Schroder Trust Company**. Seems that **International Holdings**

is closely related, both in its operations and executive direction. You may be interested in knowing that Cush succeeds a gentleman with the impressive name of Count Roger van der Straten-Ponthoz. And the chairman of International is the Earl of Perth. Suppose we'll have our first titled classmate one day? . . . **Phil Cohen** has been with the Sturtevant Division of Westinghouse since graduation, in recent years with the title of Commercial Development Manager. Now he has left Sturtevant, but if this is retirement, as we assume, he is certainly not going to take it easy. Beacon Construction Company of Boston (Norman B. Leventhal '38, President), is planning a Wellesley Office Park on Route 128, and Phil is its Development Manager.

Shocking news has come via Paul Cardinal that **George Knight's** wife, Teddy, died in late January or early February. She had been ill only a short time. Many of us knew and admired her from reunions and other class affairs. Her death is a real loss to the class. Our deep sympathies go to George and the girls. . . . Paul's letter was written on the day that the Cardinals were getting together with the Blaisdells to make final plans for their trip to the Mexican Fiesta. He had word from others who were planning long distance trips at that time including **Gib Cowan** who was about to depart for "Spain and other spots," and **Frank Manley**, off to the Caribbean. There was also word that **Lefty Walker** retired on January 1. And we told you earlier that **Cy Duevel** was to do the same on February 15.

Early in February the **Kanes** got together with the **Kelloggs** for dinner in Boston. Bubbles has completely recovered from her major operation of last spring, and they continue to shuttle back and forth between Schenectady and Toronto. . . . It was very pleasant recently to have **George Parker** stop by the office. He had completely dropped out of sight during recent years. Madeline is running a bridal shop in Malden, and George has a hearing aid company in Danvers, making small wired circuits for others on the side. One daughter is an air line stewardess, which means free trips for George and Maddy on occasion, and they've been seeing a bit of the country. . . . The New York transit strike cut down attendance at the class luncheon in January. Messrs. Schooler, Bagby, Kinsey, Tench and Lassiter made it on foot, but Walter Bagby said, "due to the absence of our dear leader, no topics of note were discussed."

Oh yes, almost skipped another vacationer in foreign parts, a real long-distance traveller. The **Carroll Dunns** reported from New York in January, "Starting on trip to South Pacific, New Zealand, Straits of Magellan, and west coast of South America on Norwegian-American. . . ." and then we got lost. Looks as though the name of the ship was too much for Carroll, and he'd written it over so many times that it was too much for us, as well. . . . **J. Lynch Piland** is off again. This time it's as Advisor to the Government of Iran for USAID. . . . And it looks as though **Sid Doyle** had retired from teaching, at least in frigid New

Hampshire. We have a new address in **Palm Bay, Fla. . . .** Many of you will remember **Melville F. Taylor**. He captained our freshman football team at field day. Even though the sophomores swamped us 13-0, when our first election was held a couple of weeks later, Mel became our first president. He didn't last beyond the first term, and has shown no interest in M.I.T. affairs since. Now we learn belatedly that he died last May. . . . So, another month goes by. Be back with you again in May.—**Henry B. Kane**, Secretary, M.I.T., Room E19-439, Cambridge, Mass. 02139.

'25

Members of the Class are making the secretary's job rather difficult since news items are few and far between. Thanks to **Tom Killian**, some news is available. Most of you are probably aware of the fact that Tom became Dean of Engineering at the University of Portland, Portland, Ore., last spring. As he writes, the School of Engineering at the University, although relatively new, has quite advanced curricula—one in general engineering and the other in Engineering-Science. The students enrolled in the latter course are honor students and most of them go on to graduate work. Tom indicates that the problems of a small university are "just as interesting, just as complicated, and in some ways almost as unsolvable as those in Washington." Another item of particular interest is that Tom was recently elected President of the Albertus Magnus Guild, a countrywide organization of more than 1,000 members with degrees in science or engineering. The Guild has many worthy objectives among which are the assisting of its members in relating the findings of science to the teachings of the Church and the promotion of the application of science to human problems with christian concern for the needs of mankind throughout the world.

A letter from **Masaru Kametani** expressed his great shock at learning of **Mac Levine's** death. "Kamm" had entertained Mac and his wife in Japan within the last two years or so. He has hopes of making a business trip to the States in the near future, and many of us in the Boston area hope to see him.

Many of you are aware of the fact that **Mary Morrison Kennedy** is vice-president of the Sheraton Corporation and in charge of all interior decorating for that concern. Since she is responsible for the decorating of more than 31,770 rooms with that international hotel chain, when you have occasion to stop at a Sheraton Hotel you can decide for yourselves whether or not you agree with the following quote from a recent talk given by Mrs. Kennedy. It reads as follows: "Men are not too fussy, but know what they like. Men are creatures of habit when it comes to home furnishings and their comfort, a good thought to keep in mind when decorating rooms for their occupancy." —**F. L. Foster**, Secretary, Room E19-702, M.I.T., Cambridge, Mass. 02139

'26

It's been a long time since your Secretary had so many things to tell you. I'm sitting in a wing chair purposely half turned from the window at Pigeon Cove but instead of keeping my attention concentrated on the notes I am getting a stiff neck turning constantly to see what's going on out on the ocean. Now I know why it takes Gunnar so long to mow the lawn in the summer time. Back to the news. The biggest item is an announcement made at last week's meeting of the Alumni Council. Nominations for officers of the Alumni Association were lead with the nomination for President and it is none other than **Ted Mangelsdorf**! The first '26 man to make it and most timely with reunion coming up so everyone can congratulate him personally. We are not only proud to have Ted receive the nomination but are pleased that such an able man with great interest in Alumni affairs has been named. . . . Another first, as well as I can recall, is to have a classmate's picture on the cover of *Newsweek*. **Jim Drain** is the one who made it and the cover caption says, "Below: President James A. Drain is pulling Joy Mfg. Co. out of the coal pits into new product areas—even lunar drills." I won't go into

40th Reunion

the details of the article but if anyone wants to look it up it was the January 8, 1966, issue. A couple of classmates including **Jim Killian** called it to your Secretary's attention. **Harold Ryan** makes the prize comment which he attached to the cover picture, "Bet there aren't many of our classmates with a head of hair like this!" **Tom Green** wasn't quite as generous in his comment which referred to "an aging Jim Drain on the cover standing in front of some circus (or was it their Monte Carlo HQ?) and two typically youthful Jim Drain's inside in the article starting on page 100."

We have nice letters from **Whit Ashbridge** and **Bill Miller** and **Pete Doelger** and **Bill Edwards** that we will have to cover in future notes because reunion is bearing down upon us hard and we want to get up on the subject. However, one additional bit of news just arrived—"George P. Edmonds, chairman of the board of the Wilmington Trust Co., was elected a member of the board of directors and the Finance Committee of E. I. DuPont de Nemours and Co. today to fill the vacancies created by the death of William duPont, Jr." Congratulations from the class George! . . . We reported last month that class president **Dave Shepard** was retiring January 31. He will continue to maintain an office at 1 Rockefeller Plaza with Telephone number (212) 974-6402. We also mentioned that Dave would be giving Austin Kelly a hand on our class gift objective. Well he wasted no time, for on February 1 we tried to telephone him and he was closeted with Austin working out plans. Three days later Dave came to Boston and your Secretary

met him for lunch. The only rental car Dave could pick up at the airport was a '66 Mustang, and jack-knifing his two meter high frame into this little car was a feat to behold, but he did it successfully! At our meeting the class was close to the 3/4 mark on our June objective which means there are a lot of bushes to be beaten or shaken in the short period left. Austin is getting a lot of high level help from the Dave Shepards, the Ted Mangelsdorfs, the George Henesses, etc. Is he getting your maximum effort? Don't wait to be contacted—the organization isn't quite good enough to keep from overlooking someone. If you are being neglected and can help in any way please contact Austin Kelly and I'll give his address again, it is 60 East 42nd St., New York City, telephone OX 7-5432 or contact Dave at the address given earlier in the notes. Dave was leaving for three weeks skiing in the Swiss Alps on February 17 but by the time you read this he will be back in New York in full gear. The reunion committee had its first meeting at the Faculty Club last Wednesday evening and long before you read these notes Jack Larkin will be sending you the first notice so I'll not repeat details. Don Cunningham, as you recall, is chairman this year and he has all of the arrangements under control at the Belmont in Harwichport. With wives being given a full fledged invitation this year for the first time the planning is a little different but it was quickly decided that turned loose on Cape Cod no formal program for them would be necessary. It is always well to mention the date even if it becomes repetitious—most will plan to arrive at the Belmont for Friday evening, June 10 and stay through Sunday noon, June 12. There was some discussion whether we should come to Pigeon Cove direct from the Belmont after lunch on Sunday or go into Cambridge first where many will be staying at the dorms. It was the consensus that going into Cambridge would use up a couple of hours with no purpose. Furthermore on Sunday we can sail right through Boston on Bud Wilbur's central artery with little or no traffic and as we head toward Pigeon Cove the traffic will all be going in the opposite direction. At our committee meeting most everyone had roast beef and the waitress wrapped the scraps for Heidi. When I walked in the front door she started barking even though she was in the basement. When I am out for dinner she expects me to bring her the tid bits and its amazing how a St. Bernard can distinguish prime beef from dog meat! I'm not only running out of space but I must get over to the "Railroad Diner" for a Sunday morning cup of coffee and the newspaper so until May, Cheerio.—George W. Smith, E. I. DuPont de Nemours & Co., Inc., 140 Federal St., Boston, Mass.

'27

Tom Knowles, who retired last year from the Goodyear Aircraft Company, of which he was president, is going to continue to make Akron, Ohio, his home. . . . 1419 Broadway, Oakland, Calif.

94712, is a new address for Ira D. Beals. So far as I know, he is still with Miller & Warnick, architects, in Oakland.

Les Woolfenden has been appointed to the new position of regional manager of manufacturing for the Chemical Division of General Aniline and Film. In the new job Les will be responsible for the operation of the company's Calvert City, Ky., chemical plant and of a similar plant to be constructed at Texas City, Texas. Starting with GAF in 1929 at Linden, N.J., Les has been designer, field engineer and plant engineer. He and his wife Ethel will continue to live at 250 Pecan Drive, Paducah, Ky.

The notes are short this month because Ann and I are going south for three weeks. I just decided to write up the material I have received since I wrote the March notes 10 days ago. Many years ago I decided to try to get something in the Review every issue. That removed the question each month of whether to wait until more news accumulated. I haven't really been doing the notes since graduation. Jim Lyles talked me into it at a cocktail party in 1942. So this fall I will start my 25th year.—J. S. Harris, Secretary, Masons Island, Mystic, Conn. 06355

'28

Here it is the middle of a dreary February with snow falling on a dull, wet day. I don't know of a better way to start off our class notes for April than to publish a bright letter from Capt. D. S. Shipley, 73 Davis Rd., Port Washington, N.Y. 11050, who once more brings up the subject of that golden paradise Tahiti:

"This is horrible; you quote me as saying I might retire to Tahiti, which is a wonderful place, but our friend Mr. DeGaulle has decided to set off his first atomic bomb in the vicinity—consequently he has ordered and stationed an innumerable number of poilus in this virgin paradise and I use these words with a certain amount of poetic license. Soooo, classmates, don't go to Tahiti yet.

"I don't know how many of you read the notes preceding and following yours but I do. I know I shouldn't give any publicity to the class of '29 (real small numerals) but A. B. Marlow was mentioned in their class notes lately. I, fortunately, was able to be A. B.'s guest in Chicago recently and had a most enjoyable time with him. As a result of this meeting, I dragged out of A.B. that he was the civil engineer who was responsible for the excellent airport that we now have at O'Hare, Chicago. His pride and joy and mine is the concrete that he laid on runway 32 (Northwest 320°) and naturally the reciprocal, 14 (Southeast 140°). I do not want to extol the virtues of a fraternity brother but this is the smoothest piece of concrete in the U. S. I was delighted on reading the class review of '29 that he was presently in foreign soil doing what comes naturally and best to A. B. Marlow.

"I see, and I should be censored for reading the class notes of 1930, that Joe Franz has passed away. This man was

one of the most interesting men that I met at the Institute; I know that all of us who were interested in or came in contact with the lower classmen of our group understand the loss of one of our Alumni.

"I got a little blurb the other day from one Don Perry. Naturally he didn't tell me his address, just wanted money for the Institute, which I am enclosing with this loooong note. I am going to get censored again, but I see in the 1926 notes that Dave Sutter, who, as you all remember, was the Captain of our successful crew during the years of 1925 and 1926, was at Wayne State University. I know that all of us in 1928 would love to read about our hero and what he is doing in the next issue of The Review and so would Geo. W. Smith, their class Secretary.

"Let's push our 40th. Regards. Ship." A note from Don Fraser, 131 Vernon Drive, Pittsburgh, Pa. 15228, says, "So many things usurp one's time these days like L. B. Johnson and taxes, I am a poor correspondent. Looking ahead to retirement, if I can last that long, I'm an active member in our local U. S. Power Squadron and very much interested in Florida. I was unable to attend the meeting described on the attached tearsheets from 'The Crucible,' but you'll be interested in the 28ers mentioned. Hurried regards."

One tearsheet with photograph announced a lecture by Leon P. Gaucher of the Research Department of Texaco, Inc. on "Energy Sources of the Future for the United States." This lecture was before the Pittsburgh section of the American Chemical Society. We quote further on a biographical sketch: "Mr. Gaucher has been with Texaco ever since his graduation from M.I.T. in 1928. His assignments have included process research and development in Port Arthur, Texas; engineering, design, economic evaluations, special assignments and trouble shooting out of Texaco's main office in New York; and now, in long range planning of research at Texaco's Beacon Research Center in Beacon, N. Y., he is responsible for keeping the Company up to date on all matters related to energy utilization, future sources of energy, interfuel competition, energy conversion methods, etc. He has contributed to the design and development of several of the commercial refinery units that are still in operation and is a co-inventor of the Texaco Synthesis Gas Generation process that is being used world-wide for the manufacture of hydrogen to produce ammonia fertilizers. He holds 20 patents, is a registered professional engineer in New York State, and a member of AICHE, the Solar Energy Society, and RESA."

Don also brought our attention in this issue of "The Crucible" to a note that under the Mellon Institute announcement R. D. Hoak recently published "The Iron and Steel Industry's Viewpoint" in Water Works Wastes.

Jim Donovan sends excerpts from a letter he received last November from Max Parshall, who is a professor in civil engineering at Colorado State College in Fort Collins, Colo. Max says: "I have your letter about our 40th Reunion. There was an earlier request for funds also. I had earlier indicated my donation for the

next three years and was very happy to do so. I have also included a donation to M.I.T. in my Will, which I trust will help the good old Institute. . . . As near as I know, there are only two other '28ers in the area, **John Shaw** and **Izzy Silverman**. We had a meeting of the Rocky Mountain M.I.T. Club in Denver, and I sat across the table from Shaw, who was in Course V with me. If committee work would consist of calling on John and Izzy, then I will gladly do it. I worked this summer helping with the silver iodide cloud seeding problem, then I conducted summer surveying camp for three weeks in the mountains at Pingree Park. We keep very busy. Mary has 30 piano pupils. We have had many interesting and pleasant experiences. Eugene List, the piano artist, had a late breakfast with us last Sunday. He had played with our symphony orchestra that evening. Mary and I are on the Board of Directors—I play in the orchestra. I can retire with a pension any time now but am not ready for retirement yet. Inflation will be a real problem. We hope to get to the 40th Reunion and hope to see you there."

This might be a good time to publish a memorandum we received last September from Jim Donovan. He announced to me that he was reappointed as a member of the Board of Registration of Professional Engineers and Land Surveyors for the Commonwealth of Mass. In connection with a national meeting of comparable boards from the other states Jim had occasion to spend a few hot days at Miami, Fla. While there, he naturally looked up old friends and had two very pleasant evenings.

"**Roland Earle** has a research laboratory, wherein he is currently concentrating on a very interesting process for applying a protective coating to food materials. He can improve the quality of frozen materials markedly. Roland's dynamism and enthusiasm belie the fact that he is supposed to be retired. Roland and Helen have an attractive home along the inland waterway—and a fishing cruiser parked out front! We didn't spend too much time talking about the past—rather Jim talked at length, indicating pessimism about the future, whereas Roland was optimistic. Helen and her mother sat quietly by. Roland's son has done very well in producing commercial presentations for TV. Won some awards—and I gather has married."

"**Don Francis** and **Trudy** live along the inland waterway at Delray Beach—and they also have a magnificent fishing cruiser tied up outside. Jim picked the wrong day to call in that Trudy had had a bout with surgery, but being a good trouper, she pulled herself together and was most pleasant. Don studies the stock market and operates with more success than Jim—in between times goes fishing or cruising. Both Don and Roland are going to help on the 40th Reunion Fund."

"Incidentally, **Ed Walton** and **Ray Wofford**, New York, have agreed to join in the fund raising effort also. I did not ask but I presume Ray is still building marvelous new buildings for National Bakeries; and I know that Ed is carrying on his consultant work in the aviation field."

From a bulletin sent out recently from Ken Brock of the Alumni Fund, dated **January 31, 1966**, we note that under the records for forty-year gifts the Class of '28 has accumulated \$107,107; and we notice that the Class of '26 has already accumulated \$961,741, but, of course, their reunion is in June of this year. We also note that the Class of '27 has accumulated \$250,960. Last year the Class of '25 contributed a forty-year gift of \$430,018. The record to date is the Class of '22, which contributed \$738,000. Of course, the Class of '26 will establish a new record well over a million dollars. —**Hermon S. Swartz**, Construction Publishing Co., Inc., 27 Muzzey St., Lexington, Mass. 02173.

'29

It was good to be back at work January 31 after my operation and I am happy to report I am fully recovered and feeling fine. My thanks to all for your kind wishes during convalescence. . . . I believe we overlooked **Harold Pease's** questionnaire when we reported about the group from New Jersey. **Harold** resides in Ridgewood where he is an engineer for the Factory Mutual Engineering Division, having worked for the same company 20 years in Fire Protection Engineering. He and his wife Marge have done quite a lot of traveling abroad in the last 10 years, including a wonderful motor trip through England and Scotland. Their son, **John Calvin**, is an M.I.T. graduate, Class of 1957, and now resides in California. **Harold** brings news of another 29'er as he writes. "Visited **Ralph Atkinson** at Monterey, Calif., in 1962. He looked happy and healthy and lives in a spectacular house."

We heard from three classmates from Rhode Island. **Harold Greenup** lives in West Barrington where he is president of Pilgrim Latex Thread Company. He had worked for Firestone Tire and Rubber Company prior to starting Pilgrim Latex Thread Company in 1945. He has made several business trips to England and Italy and his hobbies are golfing and bridge. . . . **Norman Ballou** is an Administrative Assistant at the United Shoe Machinery Corporation in Providence. He served in active duty with the Navy in World War II and is now on the "retired list" of the U. S. Naval Reserve. Photography and chess are enjoyed by **Norman** in his spare time. . . . **Alfred Guenther** of Warwick, R.I., is vice-president of Hoechst Chemical Corporation. **Alfred** writes a rather descriptive review of his life, so without attempting to paraphrase his story, we quote—"I came to M.I.T. as an exchange student from Germany, studied chemical engineering under Professor Lewis and made a master's thesis under Professor Frohlich. I also took part in the chemical engineering practice school. After completing my Ph.D. thesis in Germany I returned to the States in 1930 and accepted a position as chemist with General Aniline Company, Rensselaer, N. Y. In 1936 I married a pretty, dark-haired German girl and brought her

over to the country of my choice. We settled on an old farm, worked hard to improve the house and the grounds and raised three children in the process. In 1942 I was transferred to the new research lab of the company in Easton, Pa., where we found a wonderful home in picturesque Bucks County. These were probably the happiest five years in our family life. The property was right on the banks of the Delaware River in beautiful hilly country, we had good friends and the children had fine companionship. In 1948 I accepted a position with a new firm, the Metro Dyestuff Corporation and moved with my family to Rhode Island to our present location. Here we got our youngest daughter, **Louise**, now a high school junior. We like it in New England. In 1958 Metro was bought out by the German Farbwerke Hoechst and has since experienced a rapid extension. The pioneering days of using only second hand equipment and working shoulder to shoulder with the workmen on all three shifts are over and have made way to modern methods. Every few years we take a trip to Europe and make it a point to always spend part of our vacation in a country new to us. The big trip through our own country we are saving for my retirement because we want to have plenty of time to see the Rockies, the parks and the West Coast."

We understand **Bill Bowie** and his committee are busy formulating plans for the 40th Reunion Gift Drive, so it would be good to bear this drive in mind as we plan our "budgets."—**John P. Rich**, Secretary, P. O. Box 503, Nashua, N.H.

'30

Another of our classmates has made the very interesting shift from industry to teaching. **Mel Blackwood** reports that his "semi-retirement" to Manchester, N. H. has not produced any significant diminution in his activities. He is teaching courses in physics, metallurgy, chemistry and strength of materials at the N. H. Vocational Institute, as well as an evening course at N. E. College in Henniker. The Blackwoods are building a new home on a 25-acre tract in Sanbornton, N. H. I have been unable to find the latter municipality on my map, but apparently it is sufficiently exurban to generate certain hazards that most of us do not normally encounter. It seems that **Mel** recently stopped at the side of a snow-banked road, started to get out of his car and was almost run down by a dog sled team. To use **Mel's** words "a team of huskies came up behind the car running full speed. I closed the door partly on my legs and the whole team went by between the car and the bushes with a young girl in a fur parka running behind yelling Go! Go! I guess there are no brakes on a husky team! Everything is Go!" The Blackwoods' older daughter **Barbara** graduated from Douglas College with a major in biology and is now married. Son **Bill** is a sophomore in Bus. Adm. at Maryville College in Maryville, Tenn., and younger daughter

ter Patsy is at home. . . . **George Barker** is vice-president and director of research of Van Straaten Chemical Company in Chicago. The Barkers have two daughters; Ann, who is a second year student at Woman's Medical College of Pennsylvania in Philadelphia, and Joyce, who is a senior at Univ. of Wis. . . . **Jack Bennett** reports that in the course of a trip last spring he had lunch with the **Hijo Mareans** in Marblehead and dinner with the **Phil Holts** in Summit, N. J. As most of you know, Jack is treasurer of Goodyear Tire. In addition, he is treasurer of the Akron Community Trust and a member of the Finance Committees of the Akron Arca Council, B.S.A., and the Congregational Church in Hudson, Ohio. The Bennetts have two daughters: Polly, who is married, and Joan, who attended Smith for two years and is now at Kent State Univ. . . . **Al Bird** is doing R. & D. planning work at the U. S. Army Mobility Command in Warren, Mich. The Birds' daughters Cynthia and Deborah both graduated from Mills College. Son Thomas is a sophomore at Univ. of Oregon. . . . Supplementing the report on **Manny Birnbaum** in the January notes, we now have at hand a list of his impressive non-business activities. He is a member of the governing boards of Univ. of Western Ontario, St. Joseph's Hospital in Guelph, the Canadian Welfare Council and University of Guelph. . . . **Palmer Boggs** is professor of architecture at University of Okla. and an architectural and structural engineering consultant. His son James graduated from University of Okla. with a major in anthropology and is doing graduate work at University of Oregon. Daughter Meredith is at Pomona majoring in German and International Relations and Jacqueline is at Stanford majoring in Psychology. . . . **Ken Bucklin** is manager, Commercial Engineering, RCA electronic components and devices, in Harrison, N. J. He is responsible for the preparation, publication and distribution of all technical literature, catalogs, manuals and data sheets relating to products of the above RCA activity. The Bucklins have two married daughters; Jean, who graduated from Michigan State, and Brenda, who graduated from Sullivan College. . . . **Wallace Hope** is chief chemist of the electrical materials department of Standard T. Chemical Company in Staten Island. He worked for Palmer Electric Company in Waltham and Electric Auto-lite Company in Port Huron before joining Standard T. in 1945. The Hopes have three children and live in Ramsey, N. J. . . . **Langley Isom** has been named manager for new product development of the Vulcan Division of Reeves Brothers, Inc. His division is concerned with synthetic coated industrial fabrics. The Isoms live in Darien, Conn.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York 36, N. Y.

'31

Your 35th Reunion Committee met again on January 13 and from all reports our coming Reunion will be a gala event.

By now all of you have heard directly from your Committee and are familiar with the bang-up program that is planned . . . be sure and set the weekend beginning June 10 aside and be on hand to see our classmates. Two more Reunion Committee meetings are scheduled: Wednesday, April 13, and Thursday, May 26, at the M.I.T. Faculty Club. If any of you are in the Boston area then, your Committee would be delighted to have you attend. . . . In a welcome letter from my old radio ham friend and classmate, **Col. Fred Elser**, he wrote the following good news: "Got the info on the 35th reunion, and see they included my name as a possibility. Now it just happens that Fred Jr. may get married back East in June, so it is more than probable that I will be at the reunion if his wedding comes off in June . . . some other date of course!" Looking forward to seeing all of you at the Reunion.—**Edwin S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn.; **Gordon Speedie**, Assistant Secretary, 90 Falmouth Road, Arlington, Mass. 02174

'33

According to the calendar, the new season, Spring, is here. This is being written, at least to start, January 18, for the following reason. **Leona and I** are planning to take off via the S.S. "Brasil," **Moore-McCormack**, on what they call their Rio Carnival Cruise, which is to say that they dock at Rio de Janeiro during the Mardi Gras Carnival. Some fun, what? This cruise starts February 11 from Port Everglades (Fort Lauderdale) and returns to the same port March 14. This gets me in a bit of a stew, as these April notes must have gone in to the censors (editors) before February 11. And when do the May notes get written? Now for the mail.

I have a very interesting note from **Frank Coyle**, who says that he is a bachelor and is invading Westy's domain. Frank says that he has spent 40 years in New York, but could not get used to the place, so went back to the land of his birth, Louisiana (N'wahllins). If he owes anybody any dough, just write for the address. It appears that when he entered the Institute in 1929, he was a timekeeper for the **George A. Fuller Company**, and, as of right now, he is still timekeeper with the Fuller building, the brand new 45-story "Plaza Tower." However, Frank allows that he has worked for many companies between the two jobs with Fuller. Thanks for the letter, Frank, and if you ever see a classmate, keep me in mind, and you thereby help my entertaining a much larger number of classmates, via the notes.

While we are in the neighborhood, I have a very nice card (Christmas), too late to classify, from **William and Bobbie Harper**. **Bill's College (Chiropractic)** has moved from San Antonio to Galveston, Texas. The good Doctor and his Bobbie have found a home on Galveston Bay. William is now president of the College.

I remember that old town, and the older Galvez Hotel, where I stopped years ago. Right around the corner from the hotel was a harbor where the oyster boats came in. I moved in to watch some oyster openers at work, and one of them took off half the shell, cut the oyster loose from the other half, and handed it to me. I thanked him, ate the oyster, and told him to go right ahead, and that I had been eating oysters one hand since I was old enough to hold onto one. You just lay the oyster on the lower choppers and sort of clamp down on the edible portion, and rotate the shell away from you, still hanging onto the oyster. Thanks for the card and note, Bill, and best to you and Bobbie.

I have a nice note from **Walt Skees** (Nassau), and he invites all and sundry ('33) to come to Green Turtle Cay, and go fishing on the beach, or in his boat that sleeps 10. He didn't mention why anyone wants to sleep! Green Turtle is one hour flight from either Nassau or West Palm Beach. Walt says it is all free. He is safe enough, as these notes will appear after the season is well over. . . . I have a couple of address changes. **Dave Nason** has moved right into my (winter) backyard, Pompano Beach, from some place in Virginia. **Dick Tutein**, Course XV, has moved to Sudbury, Mass. Dr. **Dick Valentine** has moved to Uplands Drive, W. Hartford, Conn. . . . **Bill Klee**, Warren, Ohio, made The Review via the "Feed-back" column. . . . I have a plaintive note from our good Executive Vice-president, **Jim Turner**, who says that he is the only 1933 man living in western Pennsylvania, though he does admit that **Jim Vicary** lives in Erie. . . . **John B. McAleer** has moved from Rhode Island to Alexandria, Va.

I have a note from **Bill Rand**. Bill is that land and cattle fellow from Kern County, Calif., if that means anything to you folks. Bill and I have exchanged a few letters, and I did ask Bill to send in anything he happens to run across in his travels, but, and I quote him, "I am a lousy Alumnus. I do not attend any local Alumni association meetings, and have no intention of doing so. Probably the best thing for me to do would be to spend some time on the phone, or writing, to members of the class of '33 with particular reference to the San Francisco Bay area." All Bill needs is a few addresses, and he will have them before January 26. Actually there are but few of our chaps in that area, an area that I consider the finest in the state of California, excepting the Monterey area. I have had to advise Bill that he needn't expect too much from letters and that he might better choose the phone, as he will get few replies from letters, if my own letter writing response is indicative. Three weeks ago I wrote to five Officers of the class, and have heard from only one, which is about par considering that I only made one request, the same one I made of Bill.

I have a fine note, really a gem of something or other, from **Beau Whitton**. **George Wrigley**, a civil engineer of note, phoned Beau the other day and asked if Beau was interested in "a Black Liquor recovery boiler installation in Tennessee."

What is that? I asked Beau that question, and, please note, Brer Wrigley, I am asking you. George is president of Sirrine and Company, a firm which has 350 to 375 men in the Consulting Engineering and Design business. Sirrine is located in Greenville, S. C., and is specializing in the pulp and paper business. It is very active in the Midwest. Perhaps George has not gotten around to the lower Appalachian states, and north Florida yet. He will! Sirrine is also engaged in work with the Textile Business in the Carolinas. George is, as of this minute, a member of the Grandfathers Club, though he is supposed to tell me, not Beau. George has one married daughter, whose husband is in Vietnam, so she and two youngsters live with George and wife right there at home. A second child, a boy, attends Wofford College, and a third child lives at home and goes to high school. I really appreciate getting these nice notes, Beau, and I ask nothing more than that you continue. You will never be another Cal Mohr, but you are doing much better than the other 99% of the class.

Now comes a nice long letter from **Bill Pleasants**. I have been making a few cracks about this fellow having too many addresses, and it is fortunate that he really had his own good reasons. Bill says that he has had a long overdue and unmentionable operation, and, that he has been doing some long deferred free lance work. He is glad that 1965 is out of the way. I believe that I have already mentioned that Bill is now with Tippetts, Abbet, McCarthy and Stratton, an international engineering firm of New York, and he is their current Caribbean Representative. "Having worked on radomes, antennas, and radio telescopes, in special problem work, I became convinced that it would be possible to apply the same techniques to the solution of urban traffic problems: more specifically to build a structure that would elevate two traffic lanes over an intersection and relieve congestion." Bill claims to be a loyal, native born American, and hates to see our country falling behind the British and Germans, who are working on the same problem. So with the help of his present employers, our "Illustrious" classmate **Dick Morse**, and the Virginia Department of Highways, we are trying to get a research contract from the Highway Research Board. Bill suggests that he can use a lot of help from any classmates who are directly interested in relieving highway congestion. There you are, men, and I do not believe that Bill would insult you by offering to pay for the help, but you can always write the man if you wish to enroll. I have the address.

I have a short note from **Bob Winters**, in reply to something of mine, a note of congratulation on being appointed Minister of Trade and Commerce (Le Ministre du Commerce), Dominion of Canada. Here I shall not dwell on Bob's note, as I have written a much longer and more satisfactory account which will appear in the May Notes. Congratulations, Bob, on behalf of all of us. I wish, further, to mention that Bob is still on the Gold Standard; that is, the very fine note-paper furnished by the Dominion, is a fine job of

engraving, and in gold rather than the usual black, very attractive.

We have lost three classmates since our last set of notes: **Clyde A. Dively**, Course II, of Fort Wayne, Ind.; who took his Bachelors and Masters degrees at the Institute, the first with us; **Dr. Ivan S. Cliff**, Course V, of Edwardsville, Ill., who took all three of his degrees at the Institute; and, **Herbert E. Korb**, of Oakland Calif., Course VI. We have no information other than the mere mention of Clyde and Ivan, so can offer no details. Herb Korb, via a press clip, was a native of Lawrence, Mass., took his Bachelors at the same time we did, and a Masters from Yale in 1937; he served four years in World War II and retired as a Captain in the Air Force. On behalf of all of us, we wish to offer the surviving loved ones of these classmates our most sincere sympathy. It is unfortunate that these fellows had to leave us, and still only in their middle fifties.

That winds up a rather abbreviated set of notes for this month; the next will not be much better, as they are being written concurrently with this set, for reasons set forth above. This set is further shortened by my not having got any contributions from Cal Mohr, but Cal may easily be forgiven, as he is the very, very, most faithful contributor.

The June notes should be whoppers, as they are not due until April 15th, and, you may look for something on Bill Pleasants as it is probable that I may visit with him and Mrs. Pleasants in San Juan early in March. Jim Turner please note (they were roommates in the long, long ago). That's it, fellows and gals.—**Warren J. Henderson**, Secretary, Fort Rock Farm, P.O. Box 14, Exeter, N. H. 03833

'34

It is good to learn that **Arthur L. Conn**, senior consulting engineer in the Whiting laboratories of the American Oil Company, has been elected to serve a three year term on the board of directors of the American Institute of Chemical Engineers. Art has been active in the institute since 1939 and served as chairman of the national program committee this year. I wonder if Art still has time to play his banjo.

The Oil and Gas Journal has given an excellent sketch of the progress of **Dr. Robert C. Gunness**, newly elected President of Standard Oil Company of Indiana. Bob received his doctorate in chemical engineering with our class after receiving his bachelor's degree in chemistry at Amherst. After experience as an assistant professor of chemical engineering at M.I.T., during which time he gained recognition for his research work in fractionation, heat exchange and mixing—processes of particular interest to petroleum refiners—he joined the staff of Indiana Standard's research department. Bob advanced steadily to become manager of research, spent several month's leave of absence to serve as vice-chairman of the research and development board of the Defence Department in Washington, and

then returned to Standard as assistant general manager of manufacturing. During his years in the research department he made important technical contributions in the areas of fluidized-solids techniques and aviation fuel components, as well as participating in company efforts to develop commercially the results of research and applying them to plant operations. His role as an Indiana Standard executive has been outstanding.

William A. Baker is back in the news. You will recall that in the December, 1965, issue of The Review some of Bill's wanderings, doings, and published books were mentioned. In addition to his latest book, *Sloops and Shallops*, scheduled for publication this year, Bill has been engaged by the Marine Research Society of Bath to write the Maritime History of Bath, Maine. Since early American times Bath has been a center of shipbuilding in this country, and during the mid-1800's Bath was the nation's fifth largest port—700 sailing ships were built there between the years 1870 and 1890. The History, which is expected to take about four years to complete, will be a great adjunct to the Bath Marine Museum which opened its permanent building in 1964. The Bath Iron Works Corporation carries on the modern shipbuilding activities with **John R. Newell** as president and vice-chairman of the board. . . . Another honor for **Peter Kalustian**, who was recently elected Vice-president of Drew Chemical Corporation. He has assumed the responsibilities of corporate production and technical director. During his 31 years with Drew, Peter has worked principally in production and management, with experience in research, product development, formulations, engineering, plant expansion, and technical sales, service and development.

It is with great regret that we make the delayed announcement of the death of **Walter C. Wooding, Jr.**, on October 1, 1965, from a sudden heart attack. Walter was a chemist at E. I. duPont de Nemours & Co., in Louisville where he and his family had lived for 30 years. Our deepest sympathy goes to his widow, Loyta, and family. . . . The amount of news has been on the skimpy side this month. Please do not forget that your friends and classmates would like to hear about your activities. Keep your secretaries informed. —**W. Olmstead Wright**, Secretary, 1003 Howard Street, Wheaton, Ill. 60187. Other Secretaries: **Charles M. Parker**, 3 William Street, Norwalk, Conn.; **Norman B. Krim**, 15 Fox Lane, Newton Center, Mass. 02159; **Kendrick H. Lippitt**, 8735 Delgany Ave., Apt. 211, Playa Del Rey, Calif. 90291.

'36

If you haven't already indicated your intentions to attend our Thirtieth Reunion in Lenox on June 11 and 12 and in Cambridge at Alumni Day on June 13, do it at once before you forget. Class notes, exchanges of letters, etc., cannot take the place of personal contacts. Here is your opportunity to catch up on the doings of

your classmates and their families in the years since you last saw them. . . . The PR office of Raytheon has sent out a handsome picture of **Leo Kramer** with the announcement of his promotion to manager of the Magnetics Operation of the company's Microwave and Power Tube Division located in Waltham. Leo has been with Raytheon since December 1945 and most recently has been program manager for the Surface Radar and Navigation Operation. . . . **Louis Proulx** was scheduled to speak at a special technical lecture series on air pollution sponsored by the Hartford Section of the ASME in March at the University of Hartford. Louis heads the State of Connecticut efforts in Air Pollution Control. . . . **Laddie Reday** reports that he and his family were royally entertained in San Juan by **Cesar Calderon** and his family. I quote: "He has Puerto Rico made, that old Cesar, like his namesake in Rome!" The Reday family spent a few weeks island hopping before returning to southern California where Laddie is vice-president and general manager of the Western Division of Water Treatment Corporation and also has a few real estate interests. They expect a return visit from the Calderon family which by now may have occurred. . . . The Alumni office reports the death in August, 1960, of **Walter J. Diamondstone** of Pittsburgh. No details are known. . . . Also changes of address for: **Dick Denton** to Braddock Mill Lake, Marlton, N.J. 08053; **Roger Krey** to Mirror Lake, N.H. 03853; **George Parkhurst** to 7 Overlook Drive, Chelmsford, Mass. 01824; and **George Temple** to Burnham Road, Bolton, Mass. 01740. The Lummus Company has moved **Gordon Thomas** to Newark (146 Hayes Avenue, 07090) from New York City. . . . I, for one, am looking forward to seeing many of you in June. It's beautiful in the Berkshires at that time of year. —**Alice H. Kimball**, Secretary, 20 Everett Avenue, Winchester, Mass. 01890.

'37

Al Wynot recently retired from the Active Reserve after over 28 years of continuous service. He was Commanding Officer of all the Engineer Reserve Units in New England with headquarters in Boston. . . . **Dick Westfall** has moved to Aldham Rd., RD 2, Phoenixville, Pa. . . . **Berkey Bishop** operates the Kotal Company (Additives for Asphalt) in Summit, N.J., and in addition is proprietor of the Oasis Motel in Atlantic City. Berkey sent a picture of his very modern motel and from the looks, I would certainly recommend staying there when in Atlantic City.

The following have already indicated that they will attend our 30th Reunion: **George deArment**, **Ed Corea**, **Rutherford Harris**, **John Pitkin**, **Gil Mott**, **Art Zimmerman**, **Berkey Bishop**, **Link Herzeca**, and **Al Wynot**. When you write, let your Secretary know about your plans in regard to our 30th reunion so that your name can be published in the Class Notes in our growing list of those planning to attend.—**Robert H. Thorson**, Secretary,

506 Riverside Ave., Medford, Mass. 02155; **Professor Curtiss Powell**, Assistant Secretary, Room 5-325, M.I.T., Cambridge, Mass. 02142; **Jerome Salny**, Assistant Secretary, Egbert Hill, Morristown, N.J.

'39

Col. John A. Dodge, USAF-Ret., XVI, was recently appointed director of the Apollo project office in the research and advanced development division of Avco Corporation, Wilmington, Mass. Col. Dodge, a career Air Force officer for 20 years until his 1961 retirement, received his B.S. in aeronautical engineering in '39 and his masters from Caltech. The Apollo project at Avco will handle the design and fabrication of an ablative heat-shield for the Apollo spacecraft's command module. Col. Dodge served as Air Force project officer for the Von Karman Laboratory from 1950 to 1955, then as the first director of Reentry Vehicle Development for Air Force Ballistic Missile Programs until 1959, and as a military assistant for defense research and engineering in the office of the Secretary of Defense until 1961. The Dodges live on Fairwood Drive, Andover, Mass., and have one daughter, Linda Marie, 14.

George J. Laurent, VI-A, manager of radar projects, is in charge of the three Aeronutronic radar departments of Philco's technical center, Blue Bell, Pa. The Laurents—George and Fontaine, Fontaine L., 12, and William, 9, live at 95 East Levering Mill Road, Bala-Cynwyd, a suburb of Philadelphia. . . . **Maurice F. Granville**, X-Grad, Vice-president of Texaco, Inc., in charge of the petrochemical department, last year was named a member of the Manhattan College Council on Engineering Affairs, Riverdale, Bronx, N.Y. Maurice joined Texaco in 1939 as a student engineer at the Sunburst, Mont., refinery. He organized the Chemical Division at Port Arthur, Texas, in 1955, and became General Manager of the Petrochemical Department in 1958. He became vice-president of the department in 1960, and also serves as director of several affiliates and subsidiaries of Texaco. He lives on Morley Lane, Darien, Conn. He and Janet have two children, Carol, 19, and Frederick, 14.

A. Lindsay Thomson, XV-Grad, has been president of the Terry Steam Turbine Company, Hartford, Conn., since 1960. Having joined Terry in 1939, he became secretary of the firm in 1950, and vice-president in 1955. He is a director of the Hartford Steam Boiler and Insurance Company, Parker Hartford Company, Bitterman Electric Company, Hartford County Manufacturers Association, and the Connecticut Manufacturers Association.

Last November 9 the Boston Globe carried a feature story including a photo on **William S. Brewster, II**, with the headline "United Shoe Machinery—Growth in Diversity." Some paragraphs: "Last week-end it was elk and mule deer in Colorado. Next week, or next trip, who

knows? Maybe pheasant and partridge in England, or moose in Sweden or a boar in France. **William Souther Brewster**, 48, president and chief executive of United Shoe Machinery Corporation, has hunted pretty well everywhere. Quite the outdoor man, this tall, handsome scion of the Plymouth Brewsters. Fishing, skin diving, skiing, hunting, he loves them all. Needs them, too, to relax from the grinding pressure of running a \$229 million company that has been in the toils of an anti-trust suit since 1947." After that Hollywood-style lead, the newspaper article goes on to discuss United Shoe Machinery's steady diversification program, and Bill's part in it.—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017.

'40

Charlie Wampler has been named a Director of American Telephone & Telegraph Company. He is also a vice-president and secretary of this company. . . . **Tex James** is now executive vice-president of News Syndicate Company, publisher of the New York News. He will be in charge of developing and carrying out policies and programs for the newspaper. . . . **Schrade Radtke** was appointed Executive Vice-president and Director of Research for the International Lead Zinc Research Organization at its incorporation recently. ILZRO was formed by 26 sponsoring companies from nine countries to promote the industrial growth of the lead and zinc industries through research and development. . . . **Charles King** is now a senior research associate-chemistry in the Technical Staffs Division of Corning Glass Works.

Bob Lundgren, who has been with Detroit Edison since his graduation from Tech, has been promoted to Manager of Purchases and Real Estate. . . . **Herb Hollomon**, the Assistant Secretary for Science and Technology of the U.S. Department of Commerce, spoke at the Virginia Polytechnic Institute convocation in December under the auspices of the Visiting Scholar Program. He pointed out the accomplishments of aerospace scientists and also emphasized the fact that much less is being done in critical fields such as education, housing and air pollution.

It was a pleasure to have a visit from **Arnie Arch** who is secretary of the Air Pollution Association. Arnie was in Washington for a conference with officials of the National Institutes of Health to work out an agreement in this area.—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, American Security Building, Washington, D.C. 20005.

'41

Charles M. Hunter has been appointed departmental engineer in the Manufacturing Division of Du Pont's Photo Products Department. He joined Du Pont in

1941 as an engineer in its Rayon Department. From 1942 until 1950 he held a series of engineering assignments in the Electrochemicals Department. In 1950 he joined the Photo Products Department at the Parlin plant and successively was a research supervisor, plant technical superintendent, and assistant production superintendent. In 1956 he moved to Wilmington as control manager and since 1960

25th Reunion

had been facilities planning manager for the department. He resides at 104 Country Club Drive, Woodbrook, Wilmington, Del.

A letter report from Kenneth S. Brock shows that the 25th Reunion Gifts of the Class of '41 on January 14, 1966, reached \$263,647. While this is slightly larger than the \$225,338 last year by the Class of '40, it is far from the 25th Reunion gift of \$641,656 of the Class of '35.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; **Henry Avery**, Assistant Secretary, 2681 Cedarvue Dr., Pittsburgh, Pa.; **Everett R. Ackerson**, Assistant Secretary, 15 Vernon Street, South Braintree, Mass.

'42

Apparently my fervent plea has brought some results. **Bill McGuigan**, who, as you well know, is director of planning and development at Stanford Research Institute, said, "Of course people read your column. It's just that everyone is so busy they don't know what they are doing and don't want to be caught at it." . . . He also told me that **Bob Beaware** is now in charge of the Houston operations of Philco's WDL Division; **Moe Steinberg** seems to be in charge of all materials research at Lockheed Missiles and Space Company; **Carl Trexel** is Stanford Research Institute's expert on oil economics, and, finally, that the 1961 Register lists 35 '42ers in the San Francisco area.

Bill Hendrich dropped in to my office at the Harvard Business School to say hello, moved, evidently, by the plaintive note in my last column. After many years in the construction business, he is now in business on his own, and his card reads Structural Engineering Quantity Surveys. . . . **John Cantlin** has been appointed Executive Vice-president of Smithcraft Corporation; and that very good friend of the whole class, **Harvey Kram**, has been appointed Vice-president of Operations at the Leviton Manufacturing Company. . . . **Pete Volanakis** has been elected a Director of the Associated Industries of Massachusetts. As you know from my previous column, he is president of Strathmore Paper Company in West Springfield. He has also been elected to the Governing Board of Western New England College.

Sutton Monro, Professor of Industrial Engineering at Lehigh University, has been awarded a National Science Foundation Faculty Fellowship for advanced

study at the University of North Carolina. During his stay at North Carolina, he will conduct studies related to specialized areas in the field of probability. The purpose of the studies will be to assess graduate work to the undergraduate level. He is a specialist in statistical decision processes, and has been a member of the Lehigh faculty since 1959. . . . **Bill Tallman**, President of the Public Service Company of New Hampshire, has been elected a Director of the New Hampshire Insurance Company. . . . **Harry C. Platt** has been appointed First Vice-president of the Engineered Products Division of American Brake Shoe. He has been with the plant ever since graduating from the Institute.

Thomas Carrington, who is president of the Berkshire County Savings Bank, has been elected Chairman of the Hospital Planning Association of Berkshire County. . . . Most of us, I am sure, remember **Ed Thode**. He has recently been appointed Associate Director of the Engineering Experiment Station at new Mexico State University. He is head of the Department of Chemical Engineering and a professor on its faculty. Apparently the Engineering Experiment Station has a wide ranging program of basic and applied research which has covered such diverse fields as concrete, wood, and soil properties, heat transfer, gas and liquid dynamics, antennas, water problems in hydrology, and studies of saline water. **Ed** joined the college in September 1963, having been a senior research engineer for the 3M Company and a visiting staff member at Los Alamos.

I had a very nice letter from **Toni Kayanan** who, as many of you know, lives in Santurce, Puerto Rico. He has done a lot of traveling this past year, spending quite some time in Africa as Chief of a United Nations Planning and Housing Mission to the Republic of Zambia. His letter is absolutely fascinating. He was able to get to Victoria Falls and also watched the fantastically masked Makishi dancers perform their weird rituals to the rhythm of tribal music. He has certainly had an interesting career. . . . I am still hungry for news and shall be most grateful for any news of your activities which any of you could spare time to send me.—**John W. Sheetz**, Secretary, Harvard Business School, Boston Mass. 02163.

'43

Our Class should certainly be proud of the recent appointments and promotions of some of its members. **Bruce E. Horst** was named President of Barber-Colman Company, Rockford, Ill., last November. This company, which employs 5,000 people, makes a variety of products including aircraft and missile parts, automatic controls, machine and cutting tools, electrical components, industrial instruments, molded products, small motors and textile machinery. **Bruce** joined Barber-Colman in 1946 after three years as an Air Corps pilot in World War II. After 12

years in the Machine Tool and Cutting Tool Division, he became production manager for the company in 1958. He was named Vice-president of operations and became Executive Vice-president early in 1965. . . . **Andrew F. Hillhouse** was named division counsel at Solar, a division of International Harvester Company in January and also appointed assistant secretary of International Harvester. He is responsible for legal activities at Solar and will have functional responsibility for contract administration. **Andy** joined Solar in 1952 and his positions have included legal counsel for the Solar Des Moines plant, contracts manager and director, planning and marketing. He holds a law degree from George Washington University Law School and is a member of the Bar in the District of Columbia. He is a director of the National Contract Management Association and is a member of the Aerospace Industries Association Procurement and Finance Committee. . . . **Jacques R. Maroni** has been named manager, Special Marketing Studies Department, Forward Marketing Plans Office at Ford Motor Company in Dearborn, Mich. He joined Ford in 1951, and prior to his present appointment, he was Marketing Plans Manager for Lincoln-Mercury Division of Ford Motor Company. He received his master's degree in business administration from the Harvard Business School in 1948. He is married to the former Marilyn Paterson, and they have two children, Jaman (5) and Kevin (3). The family resides at Two Branford Lane in Dearborn, Mich.

William A. Selke of Stockbridge, Mass., was named by Governor Volpe to the Massachusetts State Board of Education which was recently established under new Massachusetts laws. The 28 member body was hand picked from 96 nominees submitted by the Governor's Advisory Council on Education, and is responsible for the multi-million dollar reorganization of the State's educational system. **Bill** is director of research of a division of Kimberly-Clark Corporation. . . . **George H. Hotte** became an associate professor at the University of Connecticut. Until recently Executive Vice-president of the Texplant Corporation, he will teach in the Department of Clothing, Textiles and Related Art. His appointment will enable the University to broaden its program in the textile area and contribute to the training opportunities of students in clothing promotion and merchandising. . . . **Calvin B. Dunwoody**, Chief of the Planning and Development Division of the Rhode Island Department of Natural Resources, has been one of the prime organizers in the establishment of seven new state parks in that state. Six of these parks will almost quadruple the state's major recreational facilities around the Providence-Pawtucket area. **Cal** was formerly Chief of Forestry for Rhode Island.

Ralph Kissinger, Jr., Captain, U.S.N. Retired, is the author of a recent article on calves and yearlings which appeared in "Live Stock Feeder." After retiring from the Navy as Material Officer on the staff of Commander, Submarine Force, Atlan-

tic Fleet, in 1957, he has farmed and fed cattle at Fairfield, Neb. He is past president of the Clay County Feeders Association. His article contained some interesting empirical formulas and tables on the economics of raising cattle. . . . **Peter I. Bediz**, President of Century Geophysical Corporation of Canada and Smalley's Radio Limited of Calgary, has moved to Tulsa, Okla., in his capacity as Executive Vice-president of Century's United States operations. . . . **John C. Stetson**, general manager of The Houston Post, was named Executive Vice-president and President of the Newspaper Division.

Harrison E. Cramer was named a principal scientist of the Physics Laboratory of GCA Technology Division of GCA Corporation, Bedford, Mass. He was formerly on the research staff of Massachusetts Institute of Technology at its Round Hill Field Station in South Dartmouth, Mass. . . . **Dick Zeamer** moved from Maryland to Salt Lake City, Utah, and **Dick Henning** has moved from Garden City, N.Y., to Arlington, Va. . . . Classmates in the New England area are urged to attend the class dinner to be held at the Institute early in April. Another class dinner for those in the New York area is being planned.—**Richard M. Feingold**, Secretary, Ritter & Berman, 266 Pearl Street, Hartford, Conn. 06103.

'44

As pointed out in the last issue, our regular class Secretary, **Paul Robinson**, is off to school at Wright-Patterson Air Force Base for several weeks. However, being as efficient as usual, he sent some notes to keep us informed.

In Physics Today for November 1965 there is a book review by **Sanborn C. Brown** who is still at Tech. He commented on a translation of the text "Elementary Plasma Physics" by the Russian author **L. A. Arzimovich**. Sanborn pointed out the problems which arise over translation but concluded: "I can recommend the book for the general reader." . . . **John L. Dawson, Jr.** has been doing very well in the lumber business. As President of the Dawson Lumber Company of Louisville, Ky., he has recently expanded his facilities to provide a plant with 100,000 feet kiln capacity. "The firm was founded by the late John L. Dawson, Sr., in 1917. John became associated with his father in 1946 after having served as a Naval Lieutenant during World War II." An article in Wood magazine for November 1965 continues: "My Father died ten months later and I took over and tried to figure out how to run it. Twenty years later I am still trying to figure out how to run it." He served as sales manager for Christian Lumber Company, Monticello, Ky., and reactivated the Dawson Lumber Company in 1953. John takes an active interest in local, regional and national association activities and is active in civic affairs. He was a former chairman of the N.H.L.A. Junior Conference and is a director of the Southern Hardwood Traffic Association. He still maintains a keen in-

terest in M.I.T. and is a member of the M.I.T. educational committee."

Here's the news gathered locally. **William C. Cooley**, 8401 Westmont Terrace, Bethesda, Md., who regularly attends the functions of the M.I.T. Club of Washington, D.C., says, in response to a phone call, that Exotech, Inc., which he founded in 1961 and of which he is president, now has a second division and has recently opened an office in downtown Washington for better liaison with NASA personnel. Exotech, which Bill says means "Exosphere (beyond the ionosphere) Technology" or perhaps "Exotic Technology," is engaged primarily in engineering studies for NASA and the Air Force. For NASA, Exotech is working on infrared instrumentation for detecting meteoroid punctures in spacecraft and is also doing sterilization studies for landings on other planets. For the Air Force Bill is negotiating a contract which would be a continuation of his dissertation which he finished 15 years ago when he was awarded the doctorate in mechanical engineering at M.I.T. Bill's dissertation was on the measurement of air velocity by the ion transit time method. His sponsor for the doctoral studies was Professor H. Guyford Stever, now president of the Carnegie Institute of Technology. For his research the wind tunnel used produced velocities of approximately Mach 2 with a one-inch wind tunnel section. His work for the Air Force involves instrumentation of a Mach 15, 8 foot diameter arc tunnel at Wright-Patterson Air Force Base. Exotech now has seven employees including Matthew J. Barrett, Jr., '56, VIII. We hope that Bill's wife Anne is interested in matters scientific and that their four children are similarly inclined. Anne's father is Dr. Alan T. Waterman, who was director of the National Science Foundation until his retirement a few years ago. We had the pleasure of having Dr. Waterman as a speaker for the Washington M.I.T. Club about a year and a half ago. Dr. Waterman has not become inactive by any means. Shortly after his appearance before the club, Dr. Waterman was off for a trip to Antarctica.

Colonel Clifford A. Spohn, USAF, Commander 6th Weather Wing, Air Weather Wing, Air Weather Service, Andrews AFB, Md., was elected one of five councilors for the American Meteorological Society on January 26, 1966. The AMS reports, "Col. Spohn, a native of Reading, Pa., graduated from Lehigh University in 1937. He earned his Master's and Doctoral degrees at Massachusetts Institute of Technology and after a year as instructor at M.I.T. in 1943, he entered the Air Force as weather officer. His principal assignments in the Air Force included: Chief, Evaluation and Development Division, Headquarters, Air Weather Service, 1954-1957; Operations Officer, 28th Weather Squadron, England, 1957-1960; Commander Global Weather Central, Offutt AFB, Nebraska, 1960-1964; Director, Scientific Services, 3rd Weather Wing, 1964-1965; Deputy Commander and Commander, 6th Weather Wing, 1965-. He was president of the AMS London Chapter, 1958-1959, and chairman of the Omaha-Offutt Chapter,

1961-1962. He has published in Weatherwise."

Drop me a note or give me a call if you are in the Washington area.—**John Barmby**, Interim Secretary, I.I.T. Research Institute, 1200 17th St., N.W., Washington, D.C., 20036, phone 296-1610; **Paul M. Robinson, Jr.**, Secretary, 7710 Jansen Dr., Springfield, Va. 22150.

'45

Although we are experiencing a winter blizzard here in Stamford today we trust that these notes find you preparing the lawn and garden—or painting your new hull or house—as you look forward to the spring and summer ahead. . . . Republic Oil Inc. of Danbury, Conn., announced last November the promotion of **Stanley G. Timmerman** to the post of Vice-president—Engineering. In his new capacity Stan will be responsible for all engineering and maintenance of the Company's four manufacturing plants. Stan joined Republic in 1954 as plant engineer and in 1960 was named Chief Engineer. Prior to his joining Republic, Stan was an engineer with Scovill Manufacturing and earlier in his career an instructor at Lehigh where he received an M.S. in industrial engineering in 1948. The Timmermans, 7 strong, reside in Brookfield Center, Conn.

The newly formed Forrester Corporation in Newton Upper Falls has taken industrial process control as its first operating area. Founded by Professor **Jay W. Forrester**, the venture is designed to implement Jay's theories of industrial dynamics. Jay, although President of this new concern, will continue as Professor of Industrial Management at M.I.T. As avid readers of The Review you are all aware of Jay's many activities and accomplishments at the Institute. . . . In early January **George K. Landon, Jr.**, was appointed general manager of Continental Can's Bondware Division. "Daper" joined Continental in 1946 as an engineer in research and development. He subsequently has served in management positions in several divisions of the company; most recently he was general manager of manufacturing for the Flexible Packaging Division. George and Ruth Ann (Brewer) together with their three reside at 9 Sunrise Avenue, New Canaan, Conn.—**Prexy Tom Hewson's** home town.

Dr. **Richard H. Battin** of the Lincoln Labs will chair a discussion on the Physical Problems of Re-entry at the XVIIth International Astronautical Congress in Madrid in October. . . . At Christmas, Edna Strnad thoughtfully forwarded a newsclipping from the July 15th issue of The Cleveland Press concerning an Italian Cherub fountain J.J. designed for Edna's birthday. The article reports that J.J. spent over a year designing the garden piece—all in all J.J. compiled some 52 pages of mechanics and specifications. We particularly enjoyed the following social note: "For those who have inquired no gifts are necessary for a fountain christening. Marbles or goldfish might only jam the works(!)." . . . The Springers and Mumfords are enjoying their monthly get

together in either Detroit or New York. I had two trips within weeks to Detroit at the end of the year and now Nick finds himself in New York a week per month as he completes an A.M.A. Executive Management Course. Rosemary came along last week and the four of us particularly enjoyed a "night on the town" last Tuesday. . . . **Vince Butler** reports that he and Bobbie recently had lunch with **Kirk Drumheller** in San Francisco; no details regarding Kirk's activities only a comment that the Drumhellers hope to join us in our off year Paradise Reunion in '68. . . . **Jerry** and **Libby Patterson** continue to be active in Binghamton, New York's local opera group; in fact, Jerry is, I believe, a past president. Fran and I hope to see this year's performance in March as Jerry sings in the Chorus of the Suffering Hebrews of "Samson and Delilah." . . . **Dave Trageser** spent January in Vienna, Tel-Aviv and some four other European cities promoting High Voltage Engineering wares!

The Dyer Delta, a fast fibre glass planing 19 foot centerboard sloop, is **Chick Street's** first commercial design. All you old sailors will recognize the name Dyer for the bulk of the frostbiters around the country are Dyer boats as are a majority of the Intercollegiate fleets. The Dyer boats are manufactured in Warren, R.I., by Anchorage under the supervision of one Reggy Stoops, still our most eligible bachelor! Chick was in New York for the Boat Show in late January but I, unfortunately, was out of town that particular week. Chick reports many favorable appraisals of the boat; my spies indicate that she really moves! Chick's design efforts are a part-time occupation; the balance of his time continues in his Volkswagen Agency in Cumberland, R.I.

The following 45-ers are active in Association and Fund activities about the country: Dave Flood, Bill Humphrey and Dave Trageser as Club Representatives on the Alumni Council; Tom Hewson and Dunc Luce as Alumni Representatives on Corporation Visiting Committees. Club Officers are Bill MacKenzie, President-Lehigh Valley; Clint Springer, President-Fairfield County; Ed Stoltz, Treasurer-Chicago; Jake Freiburger, Sec.-Treas.-Dallas; Mario Wunderlich, President-Guatemala; Ed Reed, Secretary-Houston; Jorge Lopez-Ramirez, President-San Juan; Nai-ping Ni, Secretary-Taipei; and Dick Martin, Treasurer in Washington.

Educational Council representatives are Vince Butler, San Francisco; Dick Martin, Washington; Ed Stoltz, Deerfield, Ill.; Dave Flood, Natick; Al Oxenham, Newark; Warren Miller, Buffalo; Marshall Byer, Vestal, N.Y.; Al Kriek, Asheville, N.C.; Bob Wilson, Philadelphia; Curt Beck, Pampa, Texas; Bob Gardner, Cedar City, Utah; Kirk Drumheller, Richland, Washington; and Bob Hildebrand, Seattle.

Regional Chairmen for the Fund are Chris Boland, Greenwich, Conn.; Leon Schindler, Concord, Mass.; Jerry Lott, Westfield, N.J.; and Ross Compton, Middletown, Ohio.—**C. H. Springer**, Secretary, c/o Firemen's Mutual Insurance Company, 420 Lexington Avenue, New York, N.Y. 10017.

'46

Chairman **Ted Henning** reports that his Reunion committee is operating in high gear these days. **Ray Brown** and **Bob Fried** are busily wrapping up program plans for our 20th Reunion at the Provincetown Inn, June 10-12, 1966. You'll soon be hearing more on this subject. As an added fillip, Bob reports we may have a visit from a personality long etched in our memories, none other than F. C. Canfield. Now Dean of Yale University's School of Drama, "F.C." plans to reminisce a bit with us if the Yale commencement schedule permits. That ought to give rise to some nostalgia! We received a postcard par avion from **Sterling Bushnell**. Bush spent three months at Torquay, England, a summer resort on the English Channel. He says his stay was for business purposes, but from the Paris postmark it appears he was able to mix in a little pleasure. Bush confesses that after his three months it will be difficult to return to the hum-drum world of investment castings.

The November 1, 1965, issue of the Christian Science Monitor had a worthwhile and well written full page article by **Peter G. Peterson** on preparation needed by future business managers. Pete was a member of our class for a year before receiving his B.S. from Northwestern University. He was vice-president of Market Facts, Inc. when he left to join McCann-Erickson, Inc. He received his MBA from the University of Chicago in 1951. By 1957 Pete was a director of McCann-Erickson. In 1961 he was named by the Junior Chamber of Commerce of the U.S. as one of the "Ten Outstanding Young Men" of the nation, and in 1962 Life magazine named him one of the 100 most important Americans under the age of 40. In 1961, at the age of 34 he was elected President of Bell and Howell Company, a position he still holds. . . . **Richard L. Ballman** has been advanced from research specialist to the position of scientist at the Indian Orchard plastics research laboratories of Monsanto's Hydrocarbons and Polymers Division located in Springfield, Mass. He is the author of articles on viscosity calculations and on the influence of molecular weight on the properties of liquid polymers. Dick, Jane and three children live at 10 Aldrich St., Granby, Mass. . . . **Stanley A. Young** has been named a principal of Drake, Sheahan, Sweeney and Hupp, distribution and materials handling consultants in New York City. As far as I know, Stan was not responsible for the recent stoppage of New York City's distribution and materials handling system. Stan has been responsible, and has pioneered in handling systems for industries including cosmetics, variety retail chains, food markets, book publishers, textiles and steel. Stan lives at 32 Amherst Drive, Hastings-on-Hudson, N.Y.

David G. Black, Jr., has recently been appointed coordinator of research in the office of the president of Brown University. Dave is responsible for coordinating sponsored research projects which now

attract about \$7,000,000 a year in outside support. He will advise and assist the faculty members in obtaining support for their research and will represent the university in its dealings with government agencies and private foundations. From 1957 to 1961 he was an associate in the patent development division of the Research Corporation of New York City. For the past few years he has been an independent consultant in patent and management affairs. Dave is a director of Protective Controls, Inc., of Attleboro, Mass.; Editions Ltd. Manufacturing Company of Pittsfield, Mass., and K.A.S.N. of The Netherlands. He is a registered professional engineer and holds a patent on a laminated film optical device used in the electra-optical field. He is a senior member of the Institute of Electrical and Electronic Engineers, a member of the American Association for the Advancement of Science, the American Chemical Society, the Institute of Aerospace Sciences, the Turks Head Club of Providence, the Metropolitan Club of New York, the North Scituate Lions Club, and is active in Boy Scout work. Dave, Mary Elizabeth, and three children live on Hartford Pike, North Scituate, R.I. A daughter, Mrs. C. M. Swift, Jr., lives in Cambridge, Mass. That's all for this month except to add a note to remind myself to send in the income tax. LBJ needs the money.—**John A. Maynard**, Secretary, 25 Pheasant Lane, North Oaks, St. Paul, Minn. 55110.

'47

Although it may seem early, plans are underway to appoint a committee to start the ball rolling for our 20th reunion. **Claude Brenner** was the host at a recent meeting which included **Jim Phillips**, **Parker Symmes**, and myself. We would like to hear from classmates who would like to work on the reunion committee. Out-of-town delegates are certainly welcome to help round-up our classmates in different parts of the country. And now for some news. . . . **M. Todd Cooke, Jr.** has been appointed assistant to the president of the Philadelphia Saving Fund Society. He was previously assistant vice-president of the First Pennsylvania Banking and Trust Company. . . . **William F. Osborne** has been appointed plant manager of the Campbell Soup Company plant in Pocomoke City, Md. He was formerly senior staff industrial engineer at the general offices in Camden, N.J. Bill is a native of Sacramento, Calif. . . . **Martin W. Hellar** has been appointed manager of the Distribution Transformer Engineering Section at the General Electric plant in Pittsfield, Mass. He was previously manager of engineering of the GE Meter Department in Somersworth, N.H. for three years. . . . **Mrs. Philip Wagley** has been named headmistress of St. Paul's School for Girls. After graduating with us, she went on to Oxford University, where she received her Ph.D. in physical chemistry. Until the next issue.—**Martin M. Phillips**, Secretary, 41 Avalon Rd., Waban, Mass. 02154.

R. L. Vader has been appointed Vice-president of technical services and products at Lockheed Aircraft Service Company. He had earlier been program manager for the Agena Command and Control system. . . . **Edwin Rich** has been named Associate Technical Director of the newly formed Communications Division at Mitre Corporation. Ed, his wife, and three children live in Lynnfield, Mass. . . . **Benjamin Kessel** was one of the seven new directors elected at the 50th annual meeting of Associated Industries of Mass. Ben participated in the founding of Computer Control Company, became a vice-president in 1957 and is now president of the firm. . . . **Dr. Dean S. Ammer**, Director of Northeastern's Bureau of Business and Economics Research, is author and editor of a forthcoming textbook on modern economics for high school students. . . . **Glenn Hilst** has been elected Treasurer of the American Meteorological Society. Glenn was a weather officer in the Air Force back in 1941 and has apparently been associated with the subject ever since. He is currently Assistant Director, Weather Systems Division, the Travelers Insurance Company. Perhaps Glenn would help us pick a date for the 20th reunion. . . . **William J. Weisz** has been promoted to Vice-president and General Manager of the Communications Division of Motorola. . . . **Dr. Herbert V. Shuster** has incorporated and now operates a 16-man laboratory, in Dorchester, which supplies consulting service to the food industry. The business sounds quite fascinating and ranges from studies of spoiled mayonnaise, to the design of a fruit juicing plant, complete with a surplus LST for hauling fruit, for the island of Raratonga. . . . **Sumner Myers, XV, SM**, penned an article for the October issue of *International Science & Technology*. The gist of his topic, "Attitude and Innovation," is that "man's accomplishments in outer space are causing old-line industries to become more innovative. Ideas are seldom transferred from space technology to these older, traditional industries, but the spirit of technological accomplishment is beginning to affect them. Nowadays, nobody wants to appear 'anti-innovative' and this change in attitude is helping to create an atmosphere in which new ideas are listened to—and sometimes even put to work." Before coming to Tech, Sumner took a BSME at Tufts. After eight years of industrial engineering, he joined the Institute of Public Administration where he made a major study of the problems of two of New York's principal commuter railroads—the New Haven and the New York Central—and recommended the reorganization of their suburban services. Since 1963, he has been director of the National Planning Association's R&D Utilization Project, wherein he is examining how technological information is used as a basis for industrial innovation.

It is with deep sorrow that we record the death of **John F. Matthews, X-A**, in London on November 23, 1965, following a two-month illness. Jack, who was 52,

was manager of the manufacturing services section of the International Wool Secretariat in England, which he joined in 1964. Previously, he had been president of Forstmann, Inc., a subsidiary of J. P. Stevens Co., Inc. here in the U.S. Our sincere sympathies are extended to his wife, the former Katherine Davenport, and children, Andrew, Joan Valerie, and Wendy.

The December-January issue of the Scranton (Pa.) Chamber of Commerce Bulletin carried a very enlightening article about **Howard Jacobson, XV**, President of the Jacobson Hat Company. "It was strictly a business decision that influenced Jacobson Hat Company to relocate their novelty hat manufacturing firm from Long Island, N.Y., to Scranton; but it was . . . the friendliness of its people that is responsible for Mr. Jacobson and his family's complete satisfaction with a new environment. After 34 years in New York City, rising costs and other factors were responsible for the firm's decision to relocate the business." Howard's company produces 40,000 novelty hats a day in an 80,000 sq. ft. plant. The firm was founded in 1930 through the promotion of other products, namely the Texaco gasoline promotion using fire chief hats. Now, most of the hats are sold for souvenirs, used for holiday and motif parties, conventions and special promotions by other firms. Howard, his wife, Claire, and two children, Gail, 15, and Jeffrey, 10, reside at 749 N. Webster Ave., Scranton, Pa.

Jack C. Page, Vice-president of Booz, Allen, and Hamilton, Inc. has written an article in *Commerce* entitled "Surge in the Urge to Merge." Jack should be able to sell at least part of that title to the movies. . . . **Howard N. Smith** is apparently one of the unrecognized heroes of the recent massive power blackout. As president of Anderson Power Products Inc., a manufacturer of electrical equipment designed especially for high current service, he supplies the switches which put the Bell Telephone System on emergency battery power when the lights go out. Howard arrived at Anderson, which is located near South Station, by a rather circuitous route which included service at Ford in Detroit, Varian Associates in Palo Alto, and then at NECCO in Cambridge. . . . **Thomas W. Folger** has been promoted to Vice-president of Kidder-Peabody.—**Richard V. Baum**, Assistant Secretary, 1718 E. Rancho Dr., Phoenix, Ariz.; **John T. Reid**, Assistant Secretary, Apt. 22C, Baltusrol Gardens, 22 W. Bryant Ave., Springfield, N.J.; **Robert R. Mott**, Secretary, Kent School, Kent, Conn.

'49

Once a year, Jan Hoegfeldt gets out an admirable news letter about his fellow members of ATO. Nine 49'ers were mentioned in the latest issue and here is what was said. "Fred Adams has had an interesting time as a member of the architectural committee of the Governor's Commission to Study Arts in New Jersey. He is also building a summer cottage in West

Harwich, Mass.; so he can hardly wait for next summer. **Bill Atkinson** is now weapons manager, in charge of all Polaris weapons systems installed in submarines. **Randy Cleworth** visited the World's Fair this year. While there, he stayed in Greenwich Village, and was surprised to find that things seemed to have settled down since the last time he was there in 1952. Randy also reports a new son, Bradford, born early September. **Bill Estes** is president of Manpower, Inc., of Wichita; but has apparently severed his other business connection with the Midwest Grain Company. **Bob Griggs** reports a new daughter, Jean Anne, born April 8, 1964. Meanwhile, his oldest daughter, Linda, age 16, is in her last year of high school, and is giving thoughts to a college choice. His second oldest daughter, Susan, is now attending Northfield School in Massachusetts. He had a good vacation in the states last summer (the Griggses live in San Juan, Puerto Rico)—went to the University of Michigan Alumni Camp near Boyne, Mich.; then a week at the National Music Camp at Interlochen, Mich., where Linda was a student for the summer; then back east via Stratford Festival in Ontario, and Niagara Falls. **Jan Hoegfeldt** has a new job at the TRW (formerly Thompson-Ramo-Woolridge) Materials Laboratory after over 15 years with Union Carbide. His new title is Research Metallurgist, and his duties include many promising assignments with wrought superalloys. The new job is still in Cleveland, but on the opposite side of town from his home, so he will be moving next spring to be closer to work. **John Knowlton** has a new assignment with Humble Oil. He is now administrator of product purchases and exchanges. This involves contact with all the oil companies with which Humble deals for the purpose of buying or swapping products to reduce transportation costs. This promises a great deal of travel, so he hopes to renew a few old acquaintances. At home, he has been on the Cub Scout Committee, worked in the yard and garden, and took a trip to the beach. **Bob Krudener** writes that he is delighted to be at the home town of the Arkansas Razorbacks, who were number one in the country when he wrote. (Note by Editor Hoegfeldt: I always wondered what was in Fayetteville besides Bob and the Shakespeare Company.) **Bill Raich** sends his congratulations to the new record holders in the population explosion (the **Ed Kerwins**, of course)! He has been waiting so some one could pass him; since these years of Cub Scouts, Girl Scouts, and PTA, are leaving him with gray hairs. At Dow Chemical, Bill is now a group leader—which he defines as a chemist who is too old to stand at the bench, but has become adept at generating and keeping track of red tape!"

The following is taken from the November issue of *What's Happening in Transportation*. See if you can spot the name of a classmate in it: "Interior Secretary Udall predicts that by 1980 consumption of liquid petroleum products will increase by 55% over 1965 levels, and the greatest gains will be for transport to provide fuel for locomotives, airplanes, ships, and motor vehicles. Air carriers report advertising expenditures of \$76 million in 1964,

more than 15 times that of railroads or bus lines and about eight times that of ship lines. Commerce Undersecretary Boyd appoints **A. S. Lang**, a former professor at M.I.T. and a research executive with the NY Central, as Deputy Undersecretary for Transport Research. His duties include supervising the high-speed ground transport program. A study of 'red tape barriers' to foreign trade shows that 43 different forms must be used for shipments exported from the U.S., while 80 are required on imports."

Lachlan Blair has been appointed Associate Professor of Urban Planning at the University of Illinois. Before this appointment, he was head of his own consulting firm in Providence, R.I. . . . The delightful annual Christmas letter from the **Jack Fogarty**s contains news that Jack has resigned his job as a department manager at Remington-Rand Univac in Philadelphia and has joined the ELCO Corporation in Willow Grove, Pa., where he will be directing research and development. . . . **Alexander Vanderburgh** has been named secretary chairman of the 1966 Spring Joint Computer Conference to be held in Boston April 26-28, 1966. This is one of two conferences sponsored annually by the American Federation of Information Processing Societies. Alex is a staff member at M.I.T.'s Lincoln Laboratory in Lexington, Mass., where he is concerned with computer programming and documentation. He and his wife Edith have three children, Ann 9, Faith 7, and Lex 5.—**Fletcher Eaton**, Secretary, 42 Perry Drive, Needham, Mass. 02192.

'50

Here are some quick notes out of our old files that will give us some quick and stale information about our classmates!!! I'm doing my Spring Cleaning so that, from now on, I'll be giving you more "inside stuff" about the Class of '50 that you won't believe it . . . even if I have to make it up!!

John Vitale, formerly chief engineer of the construction of the Lincoln Laboratory complex at Hanscom Field is assistant director for facilities and engineering at NASA in Cambridge. He's supervising the construction of the \$56 million dollar center planned for Kendall Square. John joined M.I.T.'s Radiation Laboratory in 1943 and directed construction of special microwave antennas. In 1945 he joined Kimberly Clark Corporation where he headed design and construction. He did mechanical design engineering and supervised the construction of particle accelerator, cloud chamber and laboratory instrumentation for the M.I.T. Nuclear Science Laboratory. In 1952, two years after joining Lincoln Laboratory, he was named head of the Engineering Division. He remained in this capacity until he founded and organized in 1961, Electronic Space Structure Corporation. John has a patent on structural devices and has written 10 papers covering a wide range of electronics research and equipment development topics.

Tom Godfrey sent me a Christmas card to let me know that he was enjoying the New Mexico winter sunshine. He and his family are living at 156 Tunyo, Los Alamos, N.M. Drop in and "visit" with them (at my invitation). His wonderful wife, Loie, is none other than a Class of '50 Simmons-ite so I'm sure they'll be friendly. Their life sounds great to me, a worn-out New Yorker. They're active in all sorts of things including, of course, the famous M.I.T. Club of New Mexico.

Cosimo Cataldi is also a hot weather man . . . they're the only ones that live right and do write. He is living at 5709 West Wildbriar Drive, Palos Verdes Estates, Calif. He is presently serving as chief industrial engineer for North American Aviation in the Los Angeles Division. At the same time he has obtained a Master of Business Administration Degree from the University of California and now Rudy is about to add on another professional capability. He obtained an L.L.B. degree from La Salle Extension University and was admitted to the California Bar this year.

Another Internationalist is **Paul Lobo** who is executive assistant to the President of Continental Oil Company Ltd. in London. Paul earned his M.S. degree in chemical engineering at Tech and then his Ph.D. degree from the University of Michigan. He joined Continental in 1955 as a research chemical engineer at the company's research center at Ponca City, Okla., and for eight years held key research positions including research group leader and supervising research scientist. Paul moved to Holland in 1963 as research liaison representative for Continental in Europe and last year was named coordinator of petro-chemical activities for Continental Oil Company Limited, with headquarters in London. . . . Professor **George Nez**, is serving on the faculty of the College of Architecture and Design at Kansas State University, Manhattan and will direct K-State's program leading to the master's degree in city and regional planning, mainly at the post-graduate level. Courses are interdepartmental, and include economics, geography, statistics, architecture and area development field activities including Kansas regions, communities and foreign projects. His curriculum emphasizes the emerging field of regional planning on a broad base of resources—agriculture, industry and transportation—as a framework for urbanization and public facilities. George attended Michigan State University and Olivet College in Michigan. Previously he was director of city and regional planning in Denver. Prior to that he spent most of 1964 in Skopje, Yugoslavia, on a United Nations assignment helping prepare the first outline plan for reconstruction and the first framework for a regional plan for the capital of the Republic of Macedonia. (Skopje was 80 percent destroyed by an earthquake in July, 1963). In addition to this project, George also was Chief adviser to the United Nations planning program in Ghana.

Everybody's really moving around these days. Hope to hear from you.—**Gabe Stillian**, Secretary, 4 Biscayne Drive, Huntington, N.Y.

'51

In checking the postmarks on the cards these notes are prepared from, there is quite a time lag between their receipt and the publication of their "news" in the Technology Review; however, better late than never. **George Underwood** of Cornell Dubilier Electronics has moved to Raleigh, N.C. . . . **Charles Stokes** is professor of economics at the University of Bridgeport and reports: "Still dividing my time between Connecticut and Latin America, though it is hard to know which has more difficult development problems. Would welcome any comments on my Christian Science Monitor articles." . . . **Bob Woolworth** has returned to the Boston area as Senior Soil Engineer with the consulting firm of Haley and Aldrich. . . . **John Richardson** reports that he is still with the Linde Division of Union Carbide Corporation, living in Williamsville, N.Y. with Lois and daughters Karen, Susan and Pam. . . . **Russell Osborn** is now production engineering manager at Jarrell-Ash Company and has four children: Kevin, Brian, Mary Anne and Eric. . . . **David Hubbard** is employed by Pitney-Bowes and is active in catamaran design—smooth sailing! **Kenneth Kruger** has his own architectural practice in Cambridge, Mass. **Curtis Barker** was appointed Deputy Special Assistant for University Relations in the Department of State, and is finishing his thesis for a Ph.D. in Political Science at M.I.T.

Stephen Chamberlin is with General Electric in Lynn as manager of the T-64 engine design in the small aircraft engine department. . . . **Dexter Whittinghill** still manages a little ice hockey on the river in winter and has most everyone's problem of "gaining weight and losing hair!" . . . **William Rhoads** is in Bogota, Colombia, for a two-year period as a public finance economist with the A.I.D. Mission. . . . **Antonio Terrenzio** is a project engineer with the Allied Chemical Corporation. . . . **Bill Whiston** is with Procter and Gamble in Cincinnati. . . . **Christian Rust** was promoted to Research Director of Booz-Allen Applied Research, Inc. in Bethesda, Md. . . . Sue reports that **John Powell** is head of the Quality Control Laboratories of Union Carbide Corporation in the Consumer Products Division, where Eveready batteries are made. . . . **Stan Jones** is a project engineer for the ". . . rapidly growing Raymond Corporation," manufacturing narrow aisle lift trucks. His wife and three children are helping to renovate a farm house on R.D. 1 in Greene, N.Y. where they "hope to do lots of living." . . . **Ken McCoy** is Northern California manager of Wieler & Company, an electronic manufacturers' representative. Dr. **Gust Hendrickson** is a senior research chemist at California Research Corporation, having been employed there since receiving his Ph.D. degree in Organic Chemistry from the University of Illinois in 1955. . . . **Fred Fead** reports he needs help—he moved to Denver last year to take a job with the Shaw Construction Company and found himself surrounded by Dartmouth men!

Bobbie and Al Gwynne are in Fort Madison, Iowa, completing a new house there a year ago and spending an enjoyable summer in Maine last year. . . . With five children and the wonderful weather in Sunnydale, Calif., **Charles Fisher** "hardly has time to make any remarks" but would like to say hello to friends of years past and reports that he hopes to be at the 15th reunion. . . . **John Conley** spent a month in Japan last spring setting up a licensee for the A.M. Forge Division of the American Brake Shoe Company. . . . **Stephen Eisen** is general agent in Great Neck, N.Y., for the Beneficial National Life as well as the Nathan Hale Life Insurance Company. . . . **George Benson** moved to Charlotte, N.C., in the summer of '64, where he is plant manager of the Wica Chemical Company. . . . **Lloyd Drum** is with the Data Processing Division of I.B.M.'s Los Angeles branch, working on conversion equipment for the 360 System. Again we apologize for the delay in publishing this "news" and would appreciate a postcard with notes for the class news. See you at the Reunion.—**Howard Livingston**, Secretary-Treasurer, 358 Emerson Road, Lexington, Mass.; **Forest Monkman**, Assistant Secretary-Treasurer, 6331 Beverly Dr., Mission, Kansas.

'53

It is my sad duty to report the passing of **Donald E. Pickles**, X, on January 17, following an extended illness. He had been troubled with a heart problem for many years and about 18 months ago had undergone an operation to replace a defective heart valve. Don was born in Lawrence and reared and educated in Methuen, Mass. He received an additional M.S. degree from Tech in 1954, and was active in scouting in Boston and in his subsequent travels. In 1956 he married Katherine Simons in Salt Lake City and they made their home in Tarrytown, N.Y., before moving to Brigham City, Utah, where he was employed by Thiokol Chemical as program manager. Don was a member of Sigma Nu fraternity, the American Institute of Chemical Engineers, and was area counselor for admission to M.I.T. Don will be remembered for his gentleness and friendly nature and our class extends warm condolence to his family. . . . **Hans Van Gelder**, IX, has joined the technical staff of the Mitre Corporation and will be located in their Arlington, Va., facility. Hans received a Master's degree in 1961 from the University of Pittsburgh, and prior to his present position, he served as an engineer for Westinghouse in Pittsburgh for three years and subsequently became project manager at Bunker-Ramo, Stamford, Conn.

The Silicone Division of Union Carbide has announced the appointment of **Eric G. Schwarz**, X, to supervisor in product development for cellular plastics surfacants. Eric started with Union Carbide in 1956, shortly after receiving his Master's degree from Tech in chemical en-

gineering. . . . **Bernard Palewonsky**, XVIII, has published an article on "Optimal Control: A Review of Theory and Practice" in the November 1, 1965, AIAA Journal. After obtaining his degree at Tech, Bernie received an M.A. in mathematics from Indiana University, and an M.S.E. and Ph.D. in Aeronautical Engineering from Princeton University. Dr. Palewonsky went to the Institute for Defense Analysis, Arlington, Va., in 1964. Prior to this he was a consultant at Aeronautical Research Associates of Princeton, N.J., which he joined in 1958, following a two year "hitch" with the Air Force at Wright Field as a Lieutenant.

The Alumni Association has notified us of the following changes of address: **Roger P. Bastide**, Concord Rd., Carlisle, Mass. 01741; **Bernard E. Blood**, 39 Grove St., Chestnut Hill, Mass. 02167; Major **Donald Carlson**, Box 176, Accord, Mass. 02018; **James H. Howard, Jr.**, 10 Hickory Hill Rd., Wayland, Mass. 01778; **Dong W. Lew**, Harris Intertype Company, 360 Furman St., Brooklyn, N.Y. 11201; **Roderick N. MacDonald**, 1592 Pharmacy Ave., Scarborough, Ont., Canada; Dr. **Carol R. Thompson**, Sharon Mountain Road, Sharon, Conn. 06790; **Myles K. Towne, Jr.**, 2918 188th Place, Lansing, Ill. 60438; **John C. Welch**, 7903 Red Robin Lane, Houston, Texas 77034.

Please send news!—**Norman R. Gardner**, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142.

'54

A beautiful snow covered world in the soft light of late afternoon. No, not April Fool, but my view as I write shortly after the groundhog saw his shadow. **Richard J. Hayes**, II, has been selected by NASA to be a laboratory chief at its Electronics Research Center in Cambridge. He will head the Space Guidance laboratory. He and his wife, Ellen, have three children, Priscilla, Victoria, and Richard Jr., born just prior to last Christmas. Since M.I.T. he has been with Raytheon, the Air Force, where he flew for eight years, and NASA. He also has master's degrees in astronautics from M.I.T. and in business administration from George Washington University. . . . I received a lengthy letter from **John M. Peterson**, XIV, a brief report on the last five years. He received a law degree in 1961 and consequently was involved with Aeroprojects' patent licensing activities including more than a month in Europe in 1964. Pete and his wife, Carol, have two daughters, Melissa (6) and Jennifer (3). Then in August it was back to Akron and Goodrich where he is assistant director of new products.

Marshall Fixman, X, is a recent appointee to the faculty at Yale. His field is polymers where he is considered to be one of the outstanding theorists. . . . **N. Paul Loomba**, VI, will become the head of the management science department which has just been established in the College of Business Administration at Lehigh University. . . . **Walter L. Mudgett**, VI, has left RCA in Burlington, Mass., and has joined the technical staff of

The Mitre Corporation. . . . **Richard J. Gaul**, V, who is a professor of chemistry at John Carroll University in Cleveland, spoke before the chemistry classes at the high school in Willoughby, Ohio. . . . Those of you with a sweet tooth will be interested to learn that a classmate, **George Phillips**, XV, has joined Tootsie Rolls. He is to be vice-president for corporate operations and development of the Sweets Company. He, his wife and two children will live in Ridgewood, N. J. Last year he was a recipient of Chicago's Ten Outstanding Young Men award.—**Bob Evans**, Secretary, 43 High Street, S. Acton, Mass. 01771.

'55

A few recent items and the last of the pre-union questionnaires (approximately a year old, please keep in mind) comprise this column. Then we'll be desperate again for news; so do let us know if you have moved, changed jobs, gotten promoted, married, had babies or otherwise made news. **Henry du Pont** of Fairfield, Conn., was appointed a trustee of the University of Bridgeport in December. He is manager, venture appraisal, research and development department of Remington. A member of the board of directors of the Museum of Art, Science and Industry of Bridgeport and currently vice-president, he had served as a member of the board of associates of the University for several years prior to the recent appointment. . . . The story behind the new State Street Bank Building in Boston is a story of **Frederick Stahl**'s determination to design a large office building. He went to England (where he studied under a fellowship and taught before returning to this country to work for Paul Rudolph, then open his own offices in Cambridge in 1960) to finance the project and started a corporation to complete this prominent new addition to the Boston skyline. . . . **Dale Strait** has graduated from the Air Force Institute of Technology course in applied engineering at Wright-Patterson AFB and has been assigned as an instructor at the AFIT Civil Engineering Center.

Robert Dawson has joined an architect in opening the firm of Russell and Dawson, Architects and Engineers in Hartford. He lives with his wife and three children in Ellington. . . . **Frank Tung** is back in the Boston area after spending several years in San Jose subsequent to completion of his doctorate at Columbia in 1961. . . . **John Lindenlaub** has received a doctorate and is in West Lafayette, Ind.; no details. . . . **Bob Buntschuh** is a civilian again, living in Hightstown, N. J. . . . **Stanley Barriger** has joined the New York City consulting firm of Gibbs and Hill, where he will be doing railroad work (of course). . . . **Larry Coffin** reported last April that he was undertaking a residency in cardiovascular surgery at the University Hospital in Cleveland, having received his M.D. at Western Reserve in 1959. His wife Roberta is a pediatrician on the staff at Uni-

versity Hospital, and they have two children. . . . **Marcia Kellson Harrington** was about this time last year a research assistant in psychology at the University of Oregon in Eugene, working for her doctorate—and in her non-academic hours flying.

David Peterson spends his leisure hours in the waters of southeast Alaska in his cabin cruiser. He and Theresa and their four children live in Auke Bay, where Dave runs his mechanical engineering firm. . . . **Lester Lee** and **Ruth** live in Baltimore, where Les has two positions; one in engineering with Hittman Associates, Inc., another as secretary of the Capitol City Liquor Company, Inc. He still finds time to play duplicate bridge and keep an eye on the stock market. Can't you find time to drop us a card? Co-secretaries: **Mrs. J. H. Venarde (Dell Lanier)**, 16 South Trail, Wilmington, Del. 19803; **L. Dennis Shapiro**, Aerospace Research, Inc., 130 Lincoln Street, Boston, Mass. 02135.

'57

Trond Kaalstad sent the following letter from Oslo, Norway: "First some personal history. I got my marriage license in '56, my B.S. in '57, my M.S. in '59, a daughter in '60, another one in '62 and a third one in '63 (puff!) and in '64 I employed myself. That is my story! I spent an enjoyable time in Puerto Rico from '59 to '61 setting up a computer division for the Bureau of Highways there. **Bob Laflamme**, '57, helped on the project, but later went with Adams Associates, got married and disappeared for me. However, while we were in Puerto Rico my wife and I often enjoyed the company of **Ricardo (Pancho) Gonzales**, '57, and his charming wife Elvira. Dick is a director of Caribe Motors and works in the computer field. I attended M.I.T. Club of Puerto Rico meetings and met **Luis Unikel S.**, '57, there. He left Puerto Rico for Mexico City in 1960 and I have not heard from him since. Back from Puerto Rico, I spent three years with Lockwood, Kessler & Bartlett, Inc., at Syosset on Long Island. The firm is in the consulting engineering field and among the employees was **George Alexandridis**, '56, doing highway design. He is married and has a son. In '64 I left Long Island for Norway where I am now consulting on computer applications, critical path scheduling and utilization of resources for the construction industry. I have met several M.I.T. men here among which I can mention: **Reidar Formo**, '52, **Einar Sisener**, M.S. '54, **Terje Backe** and **Jon Walter**, '56, and **Knut Hauge**, '59. They are all married and doing well. Last September my wife and I spent a day with **Ernst Torp**, '57, and his attractive wife Brit in Paris. Ernst is working for Bull, a computer firm and is occupied with computerizing hospital services."

From **Alex Bernhard** I received this letter: "I am now associated with the firm of Johnson, Johnson & Harrang here in Eugene, and Martha and I are in the process of becoming Oregonians. My clerk-

ship last year with Judge Merrill was very enjoyable. A Circuit Court of Appeals has a wide variety of business and I had the opportunity of working on all of it. We had everything from FPC rate decisions to Indian Tribal Courts' appeals. I passed the California Bar while clerking with the thought that we might stay in California. However, Oregon seemed more attractive. I passed the Bar here last August and am now specializing in Plaintiff's tort work. My third year paper (Damages for Personal Injury—the Law in Oregon) was finally published as an article in 44 Oregon Law Review 95. We are finding Eugene a very pleasant place to live. It is the site of the University of Oregon, and as a result has advantages not normally found in a city of this size (75,000). We have bought a house and, since you last saw us, have added another member of the family—**Jason Bernhard**." . . . Next month I'll have some news concerning **Kyu Lee**, our classmate from Korea.—**Frederick L. Morefield**, Secretary, 457 Harris Road, Bedford Hills, N.Y. 10507

'60

I spoke to **Joseph Pedlosky** on the phone the other day. He has recently become somewhat of a celebrity because of a constitutionality suit he is bringing against the Commonwealth of Massachusetts. He is contesting the constitutionality of a law currently on the books in Massachusetts which requires that teachers sign a loyalty oath which includes a section concerning loyalty to the Commonwealth of Massachusetts. He is currently teaching at the Institute under a temporary injunction and the case is pending in Middlesex county court; he and his lawyer expect that the case will eventually reach the higher courts. Joe said that he is finding out the hard way just how expensive it is to go to court; a local lawyer is contributing his services, but other costs are mounting. If any of you are interested in helping him out, he can be reached at the Institute, in the math department. And while we're talking about him, he received his Ph.D. in meteorology from the Institute in 1963 (after having gone through the course XVI honors program) and is now living in Boston.

I am delighted to report that we have a long letter from **Jim Cobb**; he writes: "Contrary to the suggestion that most of us are squeamish about writing class secretaries for fear of sounding immodest, my past misgivings have fallen in the category of not having done anything yet, or so it seemed. As my hopes for finishing graduate work in Chemical Engineering at Purdue University in three years were dashed and the years kept dragging on into the sixth one. I became even more reluctant. But finally the great day came late last September, and I have finally settled down out here in California (the northern part of the Mohave Desert, to be more precise) to write at last. In the little over five years at Purdue I have 1) married—my wife is a home economist and commercial art major, class of 1964

at Purdue, the former Lana Jo Lane of Lafayette, Ind. No children yet, although we just acquired a wire-haired terrier pup. 2) written a dissertation on the surface phenomena at the anode of a high-temperature fuel cell—my undergraduate thesis was also in the area of fuel cells under Professor Meissner, so this background drew me into a fuel cell program at Purdue. 3) been made a member of Phi Lambda Upsilon and Sigma Xi, 4) visited the Boston area on several occasions, although the last time I was there the Prudential Tower was just topping out, 5) accepted a position with the Baton Rouge, La., laboratories of Esso Research Company, 6) taught one semester of the introductory Chemical Engineering course at Purdue, and 7) graded scores of papers and lab reports, lived in basement apartments, fought cockroaches and water bugs, and gone through one (1) used 1950 Studebaker.

"Since leaving Lafayette in October to begin serving a two-year tour of duty as a 1st Lt. in the Chemical Corps (commitments, R.O.T.C.), I have gone through basic officers training for ten weeks at Ft. McClellan near Anniston, Ala., and am now doing research with the weather modification group of the Earth and Planetary Sciences Division of the Naval Ordnance Test Station (NOTS) at China Lake." Thank you, **Jim Cobb**. If everyone in the class would do that, I wouldn't have anything to do and I'd be very happy. Princeton University gave out advanced degrees in January and the following members of the class of 1960 were there to receive them: **Philip Martin Roth**, Ph.D. in Chemical Engineering, M.S. from M.I.T. in 1961, A.M. from Princeton in 1964; **Winthrop Spiridon Risk**, Ph.D. in Physics; **Robert Frank Stengel**, Master of Arts in Aerospace and Mechanical Sciences, M.S.E. from Princeton in 1965. **Phil Roth** has joined the staff of Shell Development Company's Emeryville, Calif. research center. . . . As they say—write if you get work.—**Linda G. Sprague**, 345 Brookline Street, Cambridge, Mass. 02139.

'61

Reunion committee eats words! The meal took place last January when they got together and counted up the number of people signed up to come to the reunion. It was sadly apparent that the Island Country Club was not going to be able to handle us all. It was, indeed, a situation in which strong men weep etc., but the intrepid crew flailed on. Several weeks of frantic searching finally resulted in the discovery of an acceptable alternative establishment. This spot is called Clauson's Inn and Country Club. Clauson's had the added virtue that people could come at their convenience rather than according to a ferry schedule. It has a golf course of 18 holes, a lake with boating or swimming, a swimming pool (if the natural waters are too cold), a bar for those of you so inclined. It's about two hours from Boston and around four

from New York. There is an airport for private planes for the more affluent among us. The replies from the February mailing show that most people have not been much put out by the change. Some people rather liked the idea of going to an exotic island like Martha's Vineyard, but have swallowed their pride and said that they would come anyhow. Though the place has changed, the date remains the same: June 10, 11, 12 (and 13 at M.I.T. for Alumni day).

There is goodness in this world after all. Some of you took pity on the class secretary and wrote in to tell what you had been doing. BLESS YOU. **Leo Hiebinger** sent a brochure about a "little" company in West Hanover, Mass., that he heads. It's "Tenvac Inc.," which specializes in high vacuum equipment (down to 2×10^{-11} torr. Leo also teaches at Northeastern University Extension division on vacuum technology one night a week. "August 14, 1965," he goes on, "a son, Leo Alexander, was born making our six year old daughter Jane a sister." In 1964 Leo's mother, who lived in Europe, was able to join Leo and his wife, Gloria, in Pembroke, Mass., where all five of them now live. Leo and Gloria would like to hear from some of the old class-mates in course X. Get cracking, old class-mates.

Maynard Johnson, "finally got my J.D. from the University of Missouri Law School. After the Missouri Bar exam in March, I will be working with the Bio-products section in the patent department at the Dow Chemical Company. After five summers of frozen foods and aerosol chocolate syrup research for the Pet Milk Company, I am finally able to join the ranks of those who can't take their work home for lunch." . . . **John Ritter** wrote in saying that he received his M.S. from M.I.T. in September 1962 and a Ph.D. from Cornell U. (1965) in Materials Science. Now Tex is an assistant professor of Mechanical Engineering at the University of Massachusetts in Amherst. He goes on: "In February of 1962 I married the former Barbara Nothel, Peter Bent Brigham nurse, and we now have one boy with another on the way this summer."

. . . **Joe Harrington**, knowing the plight of a class secretary first hand, could be counted on to keep us informed. He wrote: "Expect now to leave (for Austria) in January or thereabouts; degree (from M.I.T.) will be Sc.D. in Nuclear Engineering (experimental reactor physics); work done under AEC auspices (heavy water lattice group project). We'll be heading for the (get this one, fans) Austrian Studiengesellschaft fuer Atomenergie." Joe got a Christmas card from **Bill Swanson** who said that he was still down at the New Orleans Naval Station but that he will be taking a discharge in May and thus may be able to make it to the June reunion. . . . **Wesley Hilton's** mother wrote to say that Wesley now lives in Chula Vista, Calif., where he is working in the computer division of Ryan Aircraft. He got out of the Navy last December after three and a half years as a combat information officer aboard the USS Mt. McKinley.—**Andrew Braun**, Acting Secretary, 1038 Beacon Street, Brookline, Mass. 02146.

'62

According to a news clipping I just received, **Tom Waltz** has been real busy since I last saw him two years ago in California. He spent two years with the Peace Corps in Liberia, working with the National Planning Agency on Economic Research. While there he met and married another Peace Corps worker, a stunning blonde named Evelyn (her picture was in the news clipping). Evelyn was written up in the news magazines when she and four other girls took off in January, 1964, on a 65-day, 2,000 mile vacation in the Sahara Desert. They hitched rides and wore outfits of heavy black-wool djellaba robes, tailor-made baggy pantaloons, and turbans of shocking pink. They are back in the U.S. now, where Tom is a graduate student in economics at Northwestern University and Evelyn is working at Science Research Associates. . . . **Raymond J. Schultz**, who received his Master's degree in industrial management at M.I.T. in 1962, has been named superintendent of General Motors Steering Gear Plant 2 in Saginaw, Mich. He was formerly chief applications engineer in the actuator department. . . . **John Richters**, who is with the Research Lab of Electronics at M.I.T., recently wrote an article concerning statistical models for the generation of errors in telephone circuits that was published in the IEEE Transactions relating to Information Theory. . . . **Rich Garber** writes that he is a construction engineer at the site of a new Pacific Gas & Electric Company power plant at Santa Cruz, Calif.

Our ubiquitous class treasurer, **Will Taylor**, has completed the full circle from Stanford to Seattle (Boeing) to Fort Worth (General Dynamics) and back to Stanford again to go for his Ph.D. in Aeronautics and Astronautics. He and his wife, Patty, are living in the hills near Skyline Blvd., a picturesque area above Stanford. Will says he sees **Howie Plotkin** quite often, since Howie is now at Stanford for his Ph.D. in Industrial Engineering. Will raised the question of our first class reunion, which is only a little more than a year away. I will take this opportunity to request that my fellow class officers begin to get the movement started; the help of alumni in the greater Boston area will be greatly appreciated (I have a number of people in mind). . . . **Neil Doppelt** writes that he has been working for Esso International, Inc., in the area of market intelligence since June, 1964. Neil received an M.S. from Carnegie Tech's Graduate School of Industrial Administration in 1964.

T. J. Lageman wrote that he is now plant manager for Pearsall Chemical Corporation in Washington, N. J. He spent six months on an assignment in construction at Pearsall's Texas plant before moving to New Jersey and has now had almost four years with Pearsall. T. J. was married in November, 1964, to the former Marji Turner of Miami. They spent last Christmas there and plan to return as often as possible. He reports that **George Meyer** is in San Francisco working on his M.D. after spending a summer in Eu-

rope. Also that **Lynn Whelchel** is doing the same in Montreal and spent last summer in England on a honeymoon (sounds like the snakes are getting knocked off slowly but surely). He asked for me to write a few words about Hawaii, so I will. I'm writing this article in February and my wife spent today at the beach—need I say more about the weather? Hawaii consists of five major islands—Oahu, Maui, Kauai, Hawaii, and Molokai. Oahu contains over 90% of the population of the state (about 500,000), the capital city of Honolulu, and, of course, Waikiki. Waikiki today bears a great resemblance to Miami Beach with its high-rise hotels, sparse greenery, and narrow beaches. You have to venture to the outer islands to get the true feeling of a beautiful, lush, sparsely populated, grass-skirted paradise (which is exactly what my wife and daughter and I are doing next weekend for the first time and I will report about that in the next issue). Honolulu has many of the same problems as mainland cities—traffic jams, slums, urban renewal projects, etc. Right now there is a major move on to further community beautification, keep the high-rise buildings from blocking the view of Diamond Head, and eliminate billboards on the road leading from the airport. After all, if Hawaii should lose its beauty, it would also lose the mainstay of its economy, tourism. The cost of living, especially housing, is quite high. Housing is expensive because of the scarcity of land and everything else is expensive because it has to be brought in from the mainland. The population consists of haoles (Caucasians), Japanese, and Chinese primarily, and a mixture of Hawaiians, Filipinos, Portuguese, Samoans, etc. Everyone exists in harmony in this cosmopolitan situation, probably because no race has a majority. The public schools are poor and most of the haoles send their children to private schools like Punahou and Iolani. Although the weather and scenery are beautiful, you can acquire a case of island fever when you realize that you can't go more than twenty miles in any direction without running into the ocean. Since I travel to the mainland every month, I haven't had this problem as yet. You might find it interesting that my company (which dates back to the missionaries who sailed here from Boston and converted the natives) offers a three-month vacation every three years in lieu of the regular three-week vacation, with the proviso that you must leave the islands to obtain the extended vacation (a return from paradise to see how the rest of the world has progressed.) I meant to write a few words and I ended up writing a travelogue. I would highly recommend reading James Michener's Hawaii to those who are interested in the whole story.—**Jerry Katell**, Secretary, c/o Oceanic Properties, P.O. Box 2780, Honolulu, Hawaii 96803.

'63

This month brings a delightful letter from **Patricia Selby Marzilli** in Canberra, Australia. She is doing chemical research

at the John Curtin School of Medical Research in the Australian National University, where her husband, Luigi, is also working on his Ph.D. in inorganic chemistry. They were married last August after she finished her Master's at Brown. They honeymooned in Italy and on two Italian liners—one from New York to Italy and the other from Naples to Sydney. Three coeds were at the wedding—**Deanne Gross Dickinson**, **Cindy Kolb Whitney**, and **Meg Hickey**. Pat describes her new home as follows: "Canberra itself is a model city—all landscaped with gardens, trees, circular streets, a 1740 acre lake in the center and absolutely no factories, smog or traffic jams. We're 2000 feet above sea level in a plain surrounded by higher peaks. All the buildings are new and attractive and blend well with the many lavish embassies and the Royal Australian This-or-Thats scattered about the town. . . . Life here is much the same as in the States—same old American TV shows and movies, Maxwell House coffee, Ajax cleanser, and General Motors-Holden cars."

Dave Caskey writes that he is with Sandia Corporation in Albuquerque although he is temporarily working with a subcontractor in Los Altos, Calif. He has been elected Secretary-Treasurer of the M.I.T. Club of New Mexico.

If you have any news, send it to **Bob Johnson**, 1089 N.E. 91 Terr., Miami, Fla. 33138.

'64

The news for this month is rather sparse, perhaps due to mid-year educational activities that kept many members of the class from conveying news of themselves. But now that spring is here, please take your pen out of the deep freeze and write. . . . **Miss Gloria Capco** gave an address to the Mass. State Federation of Women's Clubs January 6th on her Ph.D. thesis concerning bacterial protein. She received her M.S. at M.I.T. in '64. . . . I spotted **George Chow** walking out of the movie Thunderball in downtown Boston in early February. He is working for Pratt & Whitney. . . . **Edward Feustel** received his M.A. in Electrical Engineering in January from Princeton. . . . **Brian Kashiwagi** recently joined the Technical Division of the Enjay Chemical Company plant at Baytown, Texas. He received an M.S. in chemical engineering last June at Stanford. . . . **Philip Lang**, a '51 college graduate and '64 M.S. graduate in Industrial Management from M.I.T. has been named manager of a new plant of GM's Steering Gear Division. . . . **Jim Lerner** received his M.S. in Astronautics at Stanford last June and has decided to stay for his Ph.D. He will take the orals this June. He loves the area, has taken up skiing, and has his eye on a French major in Portland. . . . **Richard Schulte** is now attending the Air Force Squadron Officer School at Maxwell AFB, Ala. He entered the Air Force in 1962 and received his M.S. in Astronautics from M.I.T. in '64.

That's it for now.—**Ron Gilman**, Secretary, Dane Hall 102, Cambridge, Mass. 02138.

Club News



Professor Bisbee Speaks in Baltimore

The M.I.T. Club of Baltimore held its fall dinner meeting on November 28, 1965, at the Research Institute for Advanced Studies of the Martin Company in Baltimore. The dinner was preceded by a tour of the newly opened facilities of R.I.A.S. Mr. Kenneth Jarmolow, Director of R.I.A.S. and the M.I.T. Club of Baltimore, conducted the tour.

Our annual Christmas luncheon for undergraduates of M.I.T. from the Baltimore area, was held on December 30 at the Engineers Club of Baltimore. About 40 students, representing the classes of 1966, 1967, 1968, and 1969, attended this enjoyable luncheon. Mr. Charles Speas acted as host for the meeting and called upon three students to give a short summary of their life and impressions of M.I.T. The highlight of the meeting was a presentation by Mr. Jim Veilleux, class of 1966, a 15 minute recorded commentary with 35 mm color slides, about the Institute. This presentation is an original of Mr. Veilleux and was received with enthusiasm by all.

A meeting was held on February 24, 1966, at the Cork and Bottle Restaurant. Guest speaker was Professor E. Farnsworth Bisbee from the M.I.T. Civil Engineering Department. Professor Bisbee is presently working on Project Mass Transport at M.I.T. and discussed problems and solutions of high speed rail transportation. —Hans G. Morgenstern, Secretary, 45 Dundalk Ave., Dundalk, Md.

Judge Juanita Kidd Stout Addresses Philadelphia Alumni

The members of the M.I.T. Club of Delaware Valley and their wives were honored to have Judge Juanita Kidd Stout as their speaker at the winter dinner meeting held at the Union League in Philadelphia on January 18, 1966. Approximately 200 were in attendance to hear Judge Stout present a most interesting talk on possible legislation dealing with the recovery of damages incurred as a result of a criminal act, and on laws which might protect a "Good Samaritan." A lively discussion followed, sparked by many questions from the audience.

At a short business meeting which preceded the address the following were elected as officers of the Club for 1966: President, Gilbert P. Monet, '43; First Vice-president, Robert G. Fisher, '44; Second Vice-president, Lee C. Eagleton, '44; Third Vice-president, John B. Murdock, '41; Treasurer, Harold R. Spaans, '30; Secretary, Edward S. Halfmann, '36; Assistant Secretary, Jack A. Raymond, '58. The following were elected as members of the Executive Committee: John C. Mel-

cher, '28, A. Rufus Applegarth, '35, Rea W. Stanhouse, '41, George S. Saulnier, '44; John D. Fogarty, '49; Christian Schlemmer, Jr., '59, George A. Schnabel, '60.—Edward S. Halfmann, '36, Philadelphia Electric Company, 900 Samson St., Philadelphia, Pa. 19105.

Indianapolis Alumni Learn About Commercial Photography

Twenty-five alumni and their ladies enjoyed German food and a most interesting and entertaining behind-the-scenes story on "How Modern Commercial Photography Paints a Picture." Mr. Joseph McGuire, proprietor of the Robert Young Studio, took us with pictures into the actual making of commercial photographs. He showed us the devices and artistry used to make the photographs depict and emphasize what was wanted. Mike's Steak Haus was the scene of the first meeting of the new season and it was enjoyed by all those in attendance. In attendance were: Babbitt, '17; Brown, '30; Burley, '30; Adams, '34; Fay, '32; Fay '52; Harvey, '28, Hopper, '33; Karcher, '25; Travers, '23; Welch, '13; McCuen, '40; Morse, '21. President Homer Fay announced the plans for a picnic on Sunday, June 5, and for a meeting in early December when it is planned for us to hear Prof. Chas. P. Kindleberger at a joint meeting with the Indianapolis Sciencetech Club.—Thomas G. Harvey, Secretary-Treasurer.

Washington Club Hears Congressman Vivian

The Honorable Weston Vivian of Michigan was the guest speaker at the March 17 dinner meeting. Congressman Vivian, the only M.I.T. Alumnus in the U. S. Congress, spoke in the place of Vice-president Humphrey who could not attend due to the press of official business. On February 2, Congressman Vivian spoke to the M.I.T. Downtown Luncheon Club in the Vandenburg Room of the U.S. Senate. His subject was "The Future of Research and Development; a Congressional View."

On January 27, Mrs. Diana MacArthur, Deputy Director of the Peace Corps, spoke on "The Role of the Professional in the Peace Corps" in a dinner meeting held at the Cosmos Club. Mrs. MacArthur reviewed the five year history of the Peace Corps and described the need for professional personnel for special projects as well as for program planning and direction.

On April 28 the dinner meeting at the Cosmos Club will feature a discussion of ocean sciences. The speaker, to be announced at a later date, will be a nationally known figure in the field.—Dan R. McConnell, '61, 4134A Suitland Road, Suitland, Md. 20023.



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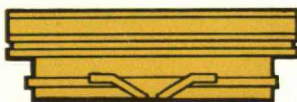
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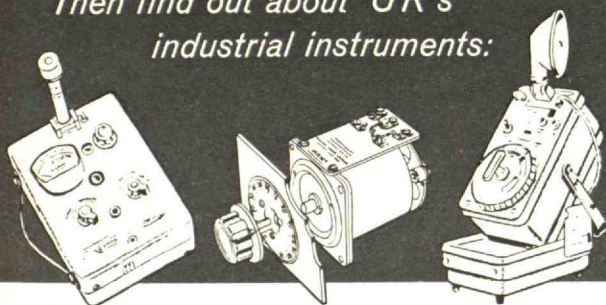
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